A PROSPECTIVE STUDY OF LAPAROSCOPIC VENTRAL HERNIA REPAIR BY USING IPOM-PLUS TECHNIQUE

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Dedicated

to

my family

&

Teachers

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ABBREVIATIONS

IPOM –	INTRAPERITONEAL ONLAY MESH REPAIR
s LVHR –	standard LAPAROSCOPIC VENTRAL HERNIA MESH REPAIR
LVHR –	LAPAROSCOPIC VENTRAL HERNIA MESH REPAIR
MAS -	MINIMAL ACCESS SURGERY
PTFE -	polytetrafluorethylene
ePTFE –	expanded polytetrafluorethylene
LR –	Laparoscopic Repair
IVH -	incisional ventral hernia
EHS -	European Hernia Society
NSAID-	non steroidal anti inflammatory drugs
TCCD –	TRANSCUTANEOUS CLOSURE OF CENTRAL DEFECTS
ME –	MESH EVENRATION
TE –	TISSUE EVENTRATION
AAS -	Activities Assessment Scale
LIVHR –	LAPAROSCOPIC INCISIONAL VENTRAL HERNIA MESH REPAIR
PCD –	PRIMARY CLOSURE OF DEFECT
NPCD-	WITHOUT PRIMARY CLOSURE OF DEFECT
PFC –	PRIMARY FASCIAL CLOSURE
LIHR –	LAPAROSCOPIC INCISIONAL HERNIA REPAIR
DC –	DEFECT CLOSURE
NC –	NON CLOSURE
BMI –	BODY MASS INDEX

ABSTRACT

Introduction: Hernia is one of the most common surgical problem. Two options are available to repair the hernia: open repair with the closure of the defect with reinforcement with mesh and laparoscopic repair with mesh repair and without closure of the defect. Laparoscopic repair of ventral hernia results in less blood loss, a shorter hospital stay and less ileus than open repair. To improve the recurrence the hybrid methods combining laparoscopic primary closure and mesh repair were introduced. The laparoscopic augmentation repair or so-called ‘‘IPOM Plus’’ combines closure of the defect with the intraperitoneal onlay mesh placement, as opposed to the classical laparoscopic IPOM, which just patches the defect and overlaps it with intraperitoneal mesh as a bridging repair.

Aim of Study: The aim is to evaluate the safety, efficacy and feasibility of Laparoscopic ventral hernia repair (LVHR) by the method of IPOM - Plus and its superiority over IPOM with particular reference to complications and recurrence.

Materials and Methods: This prospective study of 1 year for hernia repair by IPOM-Plus was conducted in General Surgery Department of Dayanand Medical College & Hospital, Ludhiana during January 2018 to December 2018 and outcome was compared with the data collected for hernia repairs done by using IPOM technique during January 2017 to December 2017. Total 50 patients included in this study, out of which 25 patients underwent IPOM-Plus (Group- A) and 25 patients underwent IPOM (Group- B).

Results: None of the patients had any intraoperative complications. Mean duration of surgery in IPOM plus group was 112.8 minutes and 102 minutes in IPOM group which was statistically not significant. Post-operative Hematoma/ Seroma formation at 2 weeks, 1 month and 3 months follow up concluded with observation of 2%, 2% and 32% patients respectively in Group B as compared to none of the patients in Group A.

The surgical site infection were present in 24% of the patients of Group B (IPOM) and none was seen in patients in Group A (IPOM plus) group at 2 weeks. None of the patients in both the groups reported chronic pain in both the groups after 2 weeks of follow up. However after 1 month and 3 months of follow up, 4% and 32% of the patients respectively in IPOM plus group and none of the patients in IPOM group had chronic pain after 1 month and 3 months of follow up. No patients in Group A (IPOM - Plus) and about 16% of the cases in Group B (IPOM) had adhesive intestinal obstruction after 3 months of follow up.

Conclusion: Laparoscopic repair of ventral hernias with closure of defect followed by mesh reinforcement is an acceptable technique and superior to non-closure of defect in terms of post-operative morbidity and body image satisfaction. It also provides an overall better quality of life to the patients. It is thus recommended to close the sac defect in laparoscopic repair of ventral hernia before mesh reinforcement, given the surgeon is experienced in this field.

Keywords: Ventral hernia · Incisional hernia ·Laparoscopic repair · IPOM-plus · Defect closure. Augmentation technique.

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INTRODUCTION

No disease of the human body belonging to the province of the Surgeon requires in its treatment a better combination of accurate anatomical knowledge with surgical skill than Hernia in all its varieties".

-Sir Astely Paston Copper (1804)

HERNIA is a word derived from a Greek word herons, meaning a branch or protrusion. Hernia is one of the most common surgical problem. Due to erect posture of the man, the anterior abdominal wall is the site of a variety of hernias. These protrude through the abdominal wall to form obvious palpable swellings.[1] Ventral Hernia is defined as a protrusion of an abdominal viscus or part of a viscus through the anterior abdominal wall occurring at any site other than groin.

Advances made in the basic and clinical sciences have allowed for the better understanding of pathophysiology of hernia formation. It is known that based on Pascal's principle of the hydrostatic forces and the law of Laplace that a hernia will continue to enlarge over the time if not treated. Increased intra-abdominal pressure will exert its greatest pressure on the portion of the wall that is thinnest, the wall thins at this point, and the diameter increases. This positive feedback loop virtually results in continued progression of hernia.

Hernia includes incisional hernias, paraumbilical hernias, umbilical hernia, epigastric hernias and spigelian hernias respectively.

The patient seeks medical advice for swelling, discomfort, acute pain, associated gastrointestinal symptoms or cosmetic symptoms, diagnosis can be achieved with ease by clinical examination or by ultrasound scanning.

A number of predisposing factors have been identified that may be related to specific patient characteristics, an underlying pathologic process, or iatrogenic factors.

From the surgeon's perspective, repair of hernia is a commonly performed procedure. Usual options are available to repair the hernia:

open repair with the closure of the defect with reinforcement with mesh and laparoscopic repair with mesh repair and with or without closure of the defect. As the result of surgical innovation, the field of hernia has improved and evolved and has been benefited significantly from technologic improvements. The tension-free repair of hernia is one of the key concepts in revolutionizing the hernia surgery.

The use of prosthetic mesh to repair the fascial defect has decreased the recurrence rates of ventral and incisional hernias. Recently, the laparoscopic approaches for hernia have increased the options and approaches for repairing the defect. Laparoscopic repair of ventral hernia results a more clear visualization of the defect(s) which makes it easier to address them with less blood loss, a shorter hospital stay and less ileus than open repair. In this modern era of surgery, most of the emphasis is made on decreasing the hospital stay of the patient, decreasing the post-operative morbidity and importance is given to cosmesis. Hence laparoscopic surgery has gained paramount importance due to its minimally invasive technique, decreased hospital stay and also better cosmesis. The trend toward minimal access surgery (MAS) has prompted general surgeons to scrutinize all operations towards laparoscopic techniques. There is continued debate as to the role of laparoscopy in ventral hernia repair, although laparoscopic repair has become increasingly popular, its outcomes need further evaluation.

The popularity of the procedure coincided with the development of barrier - coated meshes that could be placed in the peritoneal cavity, which allowed tissue ingrowth against the posterior abdominal wall and ability to decrease adhesions with the viscera.

Non-fascial closure techniques have lower rates of postoperative pain and wound infection, and shorter hospital admissions than open hernia repairs.

However, an unsightly swelling at the hernia site is common. Swelling at the site of laparoscopic repair due to the sac remnant has been variably described in the literature using terms such as bulging, pseudo-recurrence and mesh eventration. To improve and circumvent

the recurrence, hybrid methods combining laparoscopic primary closure and mesh repair were introduced. The laparoscopic augmentation repair or so-called ‘‘IPOM-Plus’’ combines closure of the defect with the intraperitoneal onlay mesh placement, as opposed to the classical laparoscopic IPOM, which just patches the defect and overlaps it with intraperitoneal mesh as a bridging repair. The aim of this prospective study was to determine the effectiveness of augmented LVHR, with regards to the complications and recurrence in terms of primary as well as well as important secondary outcomes.

AIMS AND OBECTIVES

To analyze and compare the complications, immediate as well as long term, and outcomes; in laparoscopic mesh repair of abdominal wall hernias through IPOM-Plus and IPOM.

REVIEW OF LITERATURE

Evolution of Hernia [2,3]

Surgical community has had many challenges and Hernias are one among the oldest ones over many centuries. Hernias were diagnosed in ancient times by The Egyptians (1500 B.C), the Phoenicians (900 B.C), and the ancient Greeks (Hippocrates 400 B.C). The word Hernia is derived from the Greek word hernias which means a bud or an offshoot, a budding or a bulge. Hernia also means tear in Latin literature. The earliest recorded reference to hernias appears in the Egyptian papyrus of Ebers (Circa 1552 B.C) but the formal description of umbilical hernia comes from Hindu Physician, Charaka in his writings dated 1 A. D., or earlier. This contains observations on hernias that is “when you judge a swelling on the surface of a belly …what comes out …caused by coughing”. Celsus (AD 40) an ardent follower of Hippocrates, also known as Latin Hippocrates; documented roman surgical practice, taxis, which was employed for strangulation. The trusses and bandages were used to control reducible hernias and operative interventions were undertaken for only pain.

ANTERIOR ABDOMINAL WALL:

EMBRYOLOGY:[4-6]

The abdominal wall begins to develop quite early in the embryo, but it does not achieve its definitive structure until the umbilical cord separates from foetus at birth. Most of the abdominal wall forms during closure of the midgut and reduction in relative size of the body stalk. The primitive wall is somatopleure (ectoderm and mesoderm without muscle, blood vessels, or nerves). The somatopleure of the abdomen is secondarily invaded by mesoderm from the myotomes that developed on either side of the vertebral column. This mesodermal mass (hypomere) migrates ventrally and laterally as a sheet, and the edges differentiate while still widely separated from each other into the right and left rectus abdominis muscles. The final opposition of these muscles in the anterior midline closes the body wall. Before the primordial of the rectus muscles fuse anteriorly, the mesoderm from the

hypomere splits into three layers that can be recognized by the seventh week of development. The inner sheet differentiates into the transverses abdominis muscle, the middle sheet becomes the internal oblique muscle and aponeurosis. Dorsally, the superior and inferior posterior serratus muscles develops from the superficial layer of the hypomere. Approximation of the two rectus abdominis muscles in the midline proceeds from both caudal and cranial ends and is complete by the 12th week, except at the umbilicus. The final closure of the umbilical ring awaits the separation of the cord at birth, but the ring may remain open, in which case an umbilical hernia is present. Most such hernias gradually close spontaneously.

ANTERIOR ABDOMINAL WALL [7-11]

The abdominal wall is a complex musculoaponeurotic structure. It is bounded by the flare of the costal margins and the xiphoid process of the sternum above and by the iliac crests, inguinal ligaments and pubis below. The structures that comprise the anterior abdominal wall are skin, subcutaneous tissue, superficial fascia, antero-lateral muscles of the abdomen, together with their enveloping fascial sheaths and aponeurosis, transversalis fascia, extraperitoneal adipose and areolar tissue and parietal peritoneum. The linea alba, a tendinous raphe in the midline divides the anterior abdominal wall into two parts. The umbilicus lies in the anterior median line, at the level of the disc between third and fourth lumbar vertebrae.

There are nine layers in the anterior abdominal wall:

1. Skin
2. Subcutaneous tissue
3. Superficial fascia
4. External oblique muscle
5. Internal oblique muscle
6. Transversus abdominis muscle
7. Transversalis fascia
8. Preperitoneal adipose and areolar tissue
9. Peritoneum.

Muscles of the Anterior Abdominal Wall

1. External Oblique [Obliquus Externus Abdominis]
2. Internal Oblique [Obliquus Internus Abdominis]
3. Transversus Abdominis Muscle
4. Rectus Abdominis
5. Cremaster
6. Pyramidalis

NOTE: The neurovascular plane of the abdominal wall lies between the internal oblique and transverses abdominis. The spigelian fascia is the aponeurotic part of transverses abdominis muscle between the medial border of its muscular part and the insertion of the aponeurosis into the posterior rectus sheath.

DEEP NEUROVASCULAR BUNDLE OF ANTERIOR ABDOMINAL WALL

The anterior abdominal wall is supplied by superior epigastric and musculophrenic artery above, inferior epigastric and deep circumflex iliac artery below, small branches of lower two or three posterior intercostal, subcostal and lumbar arteries, superficial epigastric, circumflex iliac artery. The venous drainage is by superior epigastric and musculophrenic vein below, inferior epigastric and deep circumflex iliac vein below. The anterior abdominal wall is supplied by lower and six thoracic nerves and by first lumbar nerve through its iliohypogastric and ilioinguinal branches.

FUNCTIONS OF ANTERIOR ABDOMINAL WALL MUSCLES

The abdominal muscles provide a firm but elastic support for the abdominal viscera against gravity. This is chiefly due to the tone of the oblique muscles, especially the internal oblique. The oblique muscles assisted by the transverses, can compress the abdominal viscera and this help in all expulsive acts, like micturition, defecation, parturition, vomiting. The external oblique can markedly depress and compress the lower part of the thorax producing forceful expiration, as in coughing, sneezing, blowing, shouting. Flexion of the lumbar spine is brought about mainly by the rectus abdominis. Lateral flexion of the

trunk is done by one sided contraction of the oblique muscles. Rotation of trunk is by action of external oblique with opposite internal oblique.

REGIONS OF ABDOMEN:

The abdomen is divided into 9 regions by 2 horizontal and 2 vertical imaginary planes. Upper horizontal plane is represented by transpyloric plane of Addison. It passes in front through the 9th costal cartilages and behind through the lower border of L1 vertebrae. Lower horizontal plane is represented by transtubercular plane drawn by joining the tubercles of both iliac crests, traced behind passes through the upper part of L5 vertebrae. Two vertical planes are each represented by the mid -clavicular lines on either sides. The nine regions between the horizontal and vertical planes present 3 zones – upper, intermediate and lower. Upper zone consists of epigastric region in the middle and right and left hypochondriac regions on either side. Intermediate zone comprises umbilical region in the middle and right and left lumbar regions on each side. Lower zone includes hypogastric region in the middle and right and left iliac regions on each side.

Modern surgery, materials and technique [12]

During the modern era of surgery – from 1900 and onwards – the concept of ventral abdominal wall hernia treatment underwent three distinct and simultaneous changes with suturing (simple laparoplasty), grafting (organic auto- and heteroplasty), and the use of prosthetics (alloplasty). At the turn of the century, William Mayo [13] described his well-known overlapping suturing technique for umbilical hernia that was later modified by others for incisional hernia. In 1955 Francis Usher introduced the use of polyester and at a later stage the improved hydrophobic polypropylene (Marlex). It could be extruded as a monofilament, knitted into a mesh and did not fray on the sides when cut. Additionally, the material was strong, inert, and it did not fragment even after boiling. Most importantly, the mesh incorporated well into tissue - even when infection was present. During his extensive investigations, he earned a lesson we still teach today. At the time it was common to approximate tissue under tension and plug the gap. Although relaxing incisions were made beyond the mesh, tension

ultimately led to recurrences. Instead, he introduced the concept of bridging the gap with sufficient overlap thus eliminating the need to approximate tissue under tension. In 1938, polytetrafluorethylene (PTFE) had accidentally been discovered by Roy Plunkett after a tank with its gaseous form was opened and a slippery and inert white powder was discovered. In 1943, the product was developed into Teflon by Du Pont and introduced to herniology in 1959. It was in 1963 that Teflon was expanded into a stronger structure (ePTFE) and Gore commercialised it as a mesh. It came into wider use after the introduction of laparoscopic repair (LR) of ventral abdominal wall hernia because of its rapid coverage with mesothelium (neoperitoneum) and its resistance to adhesion formation. Contrarily, the mesh did not integrate well with the abdominal wall and was not resistant to infection. Through the years meshes were developed and manipulated into all sorts of different formats ranging from early non-absorbable synthetic meshes (e.g. Nylon, Polyester, Polypropylene) and composite meshes (expanded polytetrafluoroethylene) to recent absorbable composite meshes and tissue-based biologic implants. The search for the ideal mesh still continues to this day. In open repair various different mesh positions have been developed. The onlay position was popularized as a technique where surgeon placed a mesh in the subcutaneous prefascial space. This position was quite susceptible to infection. The inlay position put a mesh in between the rectus abdominis muscles. It was abandoned because of high recurrence rates. Others advocated the underlay position in which a mesh was placed onto the peritoneal lining through a laparotomy. Yet, it is the sublay position of a mesh that has gained the widest acceptance to date. The sublay position was first introduced by Jean Rives in 1973 who described a retromuscular (prefascial) mesh position.[14] Shortly after, René Stoppa described the retrofascial (preperitoneal) mesh position in 1975.[15] The recurrence rates of the sublay position were relatively low because of three distinct advantages. First, a mesh could be placed that was much larger in surface area than the hernia defect itself. Second, its position made use of the intra-abdominal forces

pressing the mesh against the abdominal wall muscles. Third, there was no direct contact between the mesh and the intra-abdominal contents. It became a widely accepted technique especially in the treatment of incisional ventral hernia (IVH).The component separation techniques have served as an adjunct to open mesh repair in case of loss of domain with lateral retraction of the abdominal wall muscles or as a primary repair when a mesh could not be placed due to contamination at the surgical site. Two examples are the anterior component separation technique (m.obliquus externus release), introduced by Oscar Ramirez in 1990, and the posterior component separation technique (m.transversus abdominis release), introduced by Yuri Novitsky in 2006.[16,17] Ventral abdominal wall hernia treatment gained a distinctive new option with the introduction of laparoscopic ventral hernia repair (LVHR). The first laparoscopic repair in a patient was performed in 1982 by Ralph Ger by simply closing the peritoneal gap with the use of clips.[18] LR of primary ventral hernia (PVH) and IVH as we know it, was introduced by Karl LeBlanc and William Booth in 1993.[19] Their intraperitoneal onlay mesh (IPOM) repair consisted of reduction of the hernia content from the hernia sac and bridging of the abdominal wall defect with an overlapping ePTFE mesh. Because IPOM placement puts a mesh in direct contact with the intra-abdominal organs, two important prerequisites were required. First, the mesh should cause as little interaction as possible on the visceral side, and second, should promote incorporation of the mesh into the abdominal wall. This has led to a multitude of mesh designs with different materials, sizes of pores, textures, weight and additives.

ABDOMINAL WALL- LAPAROSCOPIC ANATOMY:

The internal surface of the anterolateral abdominal wall is covered with parietal peritoneum. The infra umbilical part of the surface exhibits several peritoneal folds, some of which contain remnants of vessels that carried blood to and from the fetus Five infra umbilical peritoneal folds – two on each side and one in the median plane – pass toward the umbilicus. The median umbilical fold extends from the apex of the urinary bladder to the umbilicus and covers the median umbilical

ligament, the remnant of the urachus (reduced allantoic stalk), that joined the apex of the fetal bladder to the umbilicus. Two medial umbilical folds, lateral to the median umbilical fold, cover the medial umbilical ligaments, the remnants of the occluded fetal umbilical arteries. Two lateral umbilical folds, lateral to the medial umbilical folds, cover the inferior epigastric vessels, which bleed if cut. The depressions lateral to the umbilical folds is peritoneal fossae, each of which is a potential site for a hernia. The location of a hernia in one of these fossae determines how the hernia is classified. The shallow fossae between the umbilical folds are: Supravesical fossae between the median and the medial umbilical folds, formed as the peritoneum reflects from the anterior abdominal wall onto the bladder. These are potential site for rare external vesical hernias. The level of the supravesical fossa rises and falls with filling and emptying of the bladder. Medial inguinal fossa between the medial and lateral umbilical folds also known as the inguinal triangles. Lateral inguinal fossae, lateral to the lateral umbilical folds, include the deep inguinal rings and are potential sites for the most common type of hernia in the lower abdominal wall – Indirect Inguinal hernia. The supra umbilical part of the internal surface of the anterior abdominal wall has a sagittally oriented peritoneal reflection – the falciform ligament- that extends between the upper anterior abdominal wall and the liver and encloses the round ligament of the liver (Ligamentum teres) in its inferior free edge. The round ligament is a fibrous remnant of the umbilical vein, which extends from the umbilicus to the liver prenatally.

CLASSIFICATION OF VENTRAL HERNIA:

Classification of the hernia based on its dimensions and location has most effectively been done by European Hernia Society (EHS). In 2009, a group of international experts met to generate a consensus on hernia classification for future study.[20] For primary hernias, a cross-table was generated based on size and location. As primary ventral hernias—not affiliated with a previous incision/operation—are typically concentric and in a limited number of locations, classification was able to be limited to two variables diameter and location. Incisional hernia

classification is inherently more complex as defects can essentially take any theoretical configuration. While standard definitions for length and width were determined ventral hernia system. As such, the final system incorporates both length and width, with arbitrary cutoffs (<4, 4–10, >10 cm). The supposition was that data would ultimately be used to make more meaningful designations and potentially validate and/or simplify this system. Reciprocally, while these EHS classification schemes were an important step in the development of standardized descriptions of hernia dimensions, this does nothing to incorporate patient comorbidities and wound class. Certainly, one could conceive a comprehensive model that would incorporate any and every mentioned variable to accurately incorporate hernia, patient, and wound characteristics. Unfortunately, the result would likely generate a system so complex that it would not be easy to remember, and thus would not be embraced by the surgical community. Other proposed systems have unfortunately met this fate.[21,22] A classification scheme capable of accurately describing the patient's preoperative state, while not becoming hindered by its own completeness, is an ideal we sought to achieve.

Chevrel and Rath [22] proposed a classification for incisional hernias in 2000. This classification is attractive, because it is simple, and the data required to reach the classification are readily obtained. Three parameters were utilized. Firstly, the localization of the hernia of the abdominal wall: divided into median (M1–M4) and lateral (L1–L4) hernias. Secondly, the size of the hernia: it was postulated that the width of the hernia defect is the most important parameter (greater than hernia defect surface, length of the hernia or size of the hernia sac), which was divided into four groups (W1–W4). As a third parameter of this classification, subgroups were made for incisional hernias and recurrences: the number of previous hernia repairs was recorded as (R0, R1, R2, R3,). Although apparently easy to use, this classification has not been commonly used in the literature. Korenkov et al[23] reported on the results of an expert meeting on classification and surgical treatment of incisional hernia, but no detailed classification

proposal resulted from this meeting. Ammaturo and Bassi[24] suggested an additional parameter to the Chevrel classification. The ratio between the anterior abdominal wall surface and the wall defect surface predicts a strong abdominal wall tension when closing the defect, with possible abdominal compartment syndrome development, and thus might influence the choice of surgical technique. Dietz et al[25] proposed another alternative classification of incisional hernias in which variables like body type, hernia morphology and risk factors for recurrence were included and recommendations made for surgical repair based on the different types. It is based on a self-explanatory taxonomy and is intended to tailor the repair to the body type and risk factors of the individual patient. The most recent and widely accepted classification is made by European Hernia Society [26] which is based on 2 variables: Localization of the hernia and size of hernia. Two midline (epigastric and umbilical) and two lateral hernias (Spigelian and lumbar) are identifiable entities with distinct localization. Cut-off values of 2 and 4 cm were chosen to describe three subgroups according to size: small, medium and large.

A. Congenital – Present at birth

1. Omphalocele

2. Gastroschisis

3. Umbilical: infant

B. Acquired

1. Midline - Diastasis recti, Epigastric, Umbilical: Adult, Acquired, Paraumbilical

2. Median – Supravesical, Anterior, Posterior, Lateral

3. Paramedian – Spigelian, Interparietal, Preperitoneal, Interstitial, Superficial

C. Incisional - It depends on previous operative incision.

D. Traumatic - Penetrating, Blunt, Destructive.

AETIOPATHOGENESIS:[27]

The main causes for production of ventral hernia can be classified into congenital and acquired causes.

1. Congenital Causes:

2. Acquired Causes:

Abdominal Wall Spaces for Mesh Placement: Onlay, Sublay, Underlay

Mesh repair has decreased the long-term rate of recurrence from 63% for primary repair to 32%, but questions remain as to the optimal positioning of the prosthetic for reduction in hernia recurrence and other complications. Herein, onlay, sublay, and underlay mesh placement are explored and an algorithm based on the available evidence is proposed. Uniformity in the definition of the positions of mesh is imperative and the European proposed guideline is employed. Inlay (interposition) mesh placement by which the mesh fills the defect and is attached to the fascial edges of the defect is discouraged due to the prohibitive risk of hernia recurrence and is not discussed further.

Technique

Onlay Mesh Placement

Onlay repair involves placement of the mesh on the anterior rectus fascia below the subcutaneous layer after approximation of the anterior rectus fascia. The advantage of this technique is its ease of application. Depending on the degree of bowel adhesions and the chronicity and thickness of the hernia sac, limited subfascial and intraabdominal dissection may be possible. For small hernias where the fascia is more easily approximated, this is an attractive option. Onlay mesh placement is associated with a shorter operative time compared to sublay positioning.[28] Additionally, the mesh is not directly in contact with the intraabdominal contents limiting the risk for bowel adherence and erosion. In contrast, there is at least a theoretical increased risk for infection from skin flora related to contact of the mesh with the skin during placement or potential for dissemination of infection from a superficial site infection to this anteriorly placed mesh. Because this technique involves subcutaneous dissection to develop the space for mesh placement, it is suspected that the risk for seroma is elevated compared to deeper mesh placement. However, the clinical significance of sterile seroma formation is questionable. In onlay repair, the hernia sac is dissected free and reduced. The hernia sac may be

left intact though the necessity of inspection of the herniated contents may warrant opening of the sac. The anterior, subcutaneous space is developed through blunt and sharp dissection typically aided by cautery just above the anterior fascia. The anterior fascia is reapproximated in the midline. When this is not possible due to tension on the closure, components separation is employed. The optimal mesh size for this technique relative to the hernia size is not well established. The mesh is affixed widely with transfascial sutures. Self-adhering mesh or fixation with adhesives are alternative options. Drain placement, with careful handling and prompt removal as permitted, is recommended to address the expected seroma in the dissected subcutaneous space.

Sublay Mesh Placement

Sublay repair refers to placement of the prosthetic in the retromuscular space posterior to the rectus abdominis and anterior to the posterior rectus fascia. The retrorectus repair, popularized by Rives and later Stoppa and Wantz, revolutionized hernia repair by offering a robust treatment of complicated incisional hernias with a low recurrence rate.[15,29] Contemporary series of the Rives-Stoppa repair have reaffirmed the value of the repair with reports of a low hernia recurrence rate of 5% while demonstrating an improved wound infection rate of 4%.[30] The retrorectus repair addresses the attenuation and lateralization of the rectus abdominis muscles and recreates the natural tension of the lateral obliques on the abdominal wall. The retrorectus space is well vascularized offering a favorable environment for tissue incorporation of the mesh. As with the onlay repair, the mesh is not in direct contact with the viscera if the posterior fascial closure is complete; however, the dissection associated with the retrorectus repair is decidedly more challenging than the onlay repair, particularly for recurrent hernias. In the retrorectus Rives-Stoppa repair the midline skin is opened and the hernia sac is exposed and dissected free from the fascial edges as with the onlay repair. The sac may be adherent to overlying thin and sometimes ulcerated skin and may require excision of both. After opening of the sac, the bowel in

inspected and adhesiolysis is performed to free the intestinal loops from the abdominal wall. The abdominal wall is inspected for additional fascial defects.

After completion of the intraabdominal dissection and irrigation, the posterior rectus fascia is opened at its medial edge on each side sharply with or without cautery and the space between the posterior rectus sheath and the rectus abdominis is developed in this avascular plane primarily with blunt dissection. The dissection is continued laterally to the margin of the rectus muscle where the landmark of the neurovascular bundles marks the extent of the dissection. Of note, below the arcuate line, the dissection is performed in the preperitoneal space of Retzius and of Bogros laterally, and thus the prosthetic mesh will only be separated from the peritoneal cavity by the peritoneum inferior to the arcuate line. The posterior layers are reapproximated in the midline and the mesh is placed in the retrorectus space. The anterior fascia is then reapproximated in the midline. For large defects where midline fascial approximation is not possible, separation of components may be needed either with external oblique release or transversus abdominis muscle release. Drains are placed at the surgeon's discretion. While frequently placed in the subcutaneous space, drain placement in the retrorectus space adjacent to the mesh should be done only after weighing the benefit of tissue apposition versus the risk of infection. An advantage of the retrorectus repair, compared to the onlay approach, is that the subcutaneous dissection is limited, made possible by the suture passing devices for the lateral transfascial mesh fixation sutures.

Underlay Mesh Placement

Underlay mesh placement describes mesh positioning in the preperitoneal subfascial space or the intraperitoneal space deep to the fascia and peritoneum. The intraperitoneal repair may be performed with either an open or laparoscopic approach, the latter associated with a lower infection risk.[31,32] Compared to suture repair, both laparoscopic and open underlay mesh placement decreased recurrence risk without increasing the risk of serious mesh infection or

fistula formation.[33] Underlay repair spares the perforating vessels compared to a wide onlay repair and avoids skin and musculofascial flaps potentially lessening the risk for ischemia and wound complications. In contrast to overlay repair, underlay may be more difficult and lengthy but straighter forward than sublay mesh positioning. Underlay mesh repair for incisional hernias may require extensive dissection and adhesiolysis to allow a clear space for a widely overlapping mesh repair. Additionally, if the overlying fascia cannot be reapproximated, a bridging mesh repair will not restore the midline. For some active patients, the functionality of such a repair is not optimal. Careful selection of the prosthetic mesh is critical to the long term success of intraperitoneal underlay repair due to the exposure of the intestines to the mesh and potential for adhesions or erosion. Similar to the other described techniques, underlay mesh placement involves freeing the hernia sac from the fascial edges and adhesiolysis of any adherent bowel or omentum. For reperitoneal underlay repair, the hernia sac is left intact if possible and the preperitoneal space is widely developed to allow adequate overlap of the mesh repair. Because preservation of the peritoneum can be difficult due to its thin nature, this technique is utilized primarily for smaller ventral defects such as umbilical or epigastric hernia repairs. These preperitoneal repairs are typically performed with open technique though laparoscopic repair has been reported.[34] Open intraperitoneal mesh placement is conducted in similar fashion but extensive adhesiolysis may be needed to identify all ventral hernia defects and to clear a wide berth for placement of the prosthetic with wide overlap of the hernia(s). Close abdominal wall inspection is essential for avoidance of the early hernia recurrence which may actually be a missed hernia defect. The intestine must be protected from the synthetic mesh with use of an adhesion-barrier coated polyester or polypropylene mesh or an expanded polytetrafluoroe-thylene mesh. Alternatively, in cases of contamination, biologic mesh is favored although its long term durability is limited due to eventual eventration and reherniation, especially in cases of where the overlying

fascia cannot be closed.[35] The mesh is secured with transfascial mattress sutures and may be supplemented by absorbable or permanent tacks in between sutures to reduce the risk of bowel slippage anterior to the mesh in between the transabdominal sutures. Another common example of an intraperitoneal underlay mesh use is the laparoscopic ventral hernia repair.[36]

LAPAROSCOPIC VENTRAL HERNIA REPAIR (LVHR):[37-40]

Laparoscopic Repair of Ventral Hernia is being done at a time when laparoscopic.

Appendectomy and cholecystectomy has shown definite benefit over open procedures. Although technically demanding and time consuming, it is safe and feasible. With introduction of different prosthetic mesh and great improvement in the laparoscopic techniques, there is a drastic reduction in the complication rate. And with many skilled surgeons being trained in laparoscopic technique, operative time has become shorter. Increasing application of laparoscopic surgery all over the world indicate its advantage over the open technique, however there is many controversies but laparoscopic surgery continue to evolve latest development with Regard to Laparoscopic Repair of Ventral Hernia The interest in less morbid herniorrhaphies and the appeal of minimally invasive surgery encouraged development of laparoscopic methods for repairing incisional hernias. These techniques are based on the same physical and surgical principles as the open underlay procedure described by Stoppa, Rives et al, and Wantz. Since the first report of laparoscopic ventral hernia repair (LVHR) in 1992, the operation has grown in popularity with the belief that it may offer shorter hospital stays, improved patient outcomes, and fewer complications than traditional open procedures. Several comparative studies are now available that support this assertion. Limiting factors in most of these and the J series that describe LVHR include limited sample size, varying techniques, and restricted follow-up and there is more data in the literatures available compared to the past due to increased popularity of this procedures.

SURGICAL TECHNIQUE [41]

Since fixation of the mesh in the anterior abdominal wall with tacks is a painful procedure for the patient, this must be explained before the surgery. The advantages of the laparoscopic method are especially represented by the minimal risk of infection of the mesh, abdominal wall infection and much faster postoperative recovery. When all the operative risks have been made known and assumed by the patient, then the informed consent, mandatory for any surgery, is signed.

➔ The Operating Device

For most patients, the position on the operating table is dorsal decubitus with the upper limbs in abduction. Depending on the intraoperative situation, for easier dissection of the adhesions, the patient can be placed in Trendelenburg or rotated laterally. The pressure zones will be protected to avoid bedsores. The surgeon will stand on the left of the patient with the helping surgeon 1 on the right side and helping surgeon 2 on the contralateral side. For ergonomic reasons, they can operate in seating position. The monitor is placed in front of the surgeon and the anesthetist at the patient's head.

➔ Instruments

Similar to other laparoscopic surgeries:-

Veress needle for the formation of pneumoperitoneum

Trocars of 10, 5 mm, sometimes optionally, trocars of 12/15 mm are needed for large mesh insertion

Telescope of 0 or 30 degrees

5 mm and 10 mm atraumatic graspers

Mono and bipolar scissors. We use a low-power current (50W cutting and 40W coagulation)

Applicator of clips, needle holder, suture threads

Ligasure forceps, harmonic scalpel when technical equipment allows

Intra-Abdominal Access

Getting into an abdomen is an important moment in laparoscopic surgery. To minimize the risk, we will avoid placing the Veress needle on the median line. We will choose to make an incision at the Palmer

point (at the intersection of the left costal margin with the left medioclavicular line) and insert the Veress needle at this level.

CO2 attachment gives us details about the evolution of pneumoperitoneum. When we have a continuous insufflation, with no oscillations, it means that the intraperitoneal space is relatively free. We will work at an initial pressure of 15 mmHg to have a larger operative space at the time of the first trocar insertion. Then, we lower the pressure to 12 mmHg. Another technical option is the “open” method, in which we make an incision in the left hypochondrium and dissect the each plane of the abdominal wall up to the level of the peritoneum which is then penetrated with a blunt instrument or by the surgeon’s finger. We will then verify the peritoneal cavity with the fingers, by removing any adhesions and introduce the 10 mm optical trocar without the mandrel.

➔ **Placement of Trocars**

After making pneumoperitoneum, we will introduce the first 10 mm trocar, the optical trocar. As it is a blind procedure, we will use, if possible, a 10 mm bladeless trocar. After the exploration of the peritoneal cavity, we introduce another 2 trocars (10 or 5 mm depending on the surgeon’s preference) placed in the left flank as far away from the median line. If necessary, we will use additional trocars in the contralateral flank. However, at the moment of fixing the mesh, it is compulsory to have a trocar

➔ **Adhesiolysis Dissection**

The release of the abdominal wall from adhesions (with epiploon or intestinal loops) and the reduction of the hernial sac is a delicate and difficult procedure, consuming time that can extend the operative time. Careful attention is needed to avoid causing intestinal lesions that will compromise surgery by the application of a mesh in a potentially septic environment. A 30^{o} telescope provides a detailed view and from various angles view, facilitating the dissection. Blunt dissection and scissor dissection dominate this operative time. Avoid to the fullest the use of dissection current due to the risk of thermal damage to the intestinal loops. The dissection starts from simple to complex, from the

area of maximum visibility and continues in the visceral-parietal adhesion. An external pressure exerted on the abdominal wall, especially in the herniated area, pushes the contents of the sac to the abdomen, facilitating dissection at this level. In the case of tight entero-parietal adhesions, to avoid an intestinal lesion, we will dissect the parietal peritoneum and the abdominal wall. The release of the abdominal wall of adherences is mandatory because they can hide small openings, not shown at clinical and imaging examinations (Swiss-cheese hernias) that may be the origin of early relapses. For supraumbilical incisional hernias, it is necessary to section the falciform ligament to create space for prosthesis placement.

➔ **The Measurement of Parietal Defect**

For the success of the surgery, it is important that the parietal defect (multiple defects) be covered by the prosthesis at least 5 cm exceeding the size of the hernial orifice. For a fairly accurate measure intraperitoneal manner. The intraabdominal pressure will be reduced to 5-6 mmHg because abdominal distension apparently increases the sizes of the parietal defect. The defect margins are marked by the transparietal passage of several syringe needles of 20 G. Using a metric roulette, the defect is measured between the inserted needles, both longitudinally and transversally. If the defect exceeds the length of the roulette, insert another transabdominal needle, measure to this level and then continue measuring to the edge of the defect, the two segments gathered representing the actual length. Finally, after assessing the size of the defect, consider a mesh that exceeds the hernial orifice by 5 cm.

➔ **Closure of the Parietal Defect**

The first laparoscopic procedure for the solving of hernias was to reduce the hernia and to cover the parietal defect with a prosthesis that surpassed the edges of the hernial orifice (IPOM). This procedure only refers to the defect coverage and less to restoring the functionality of the abdominal wall. The current concept aims at restoring the white line by suturing aponeurotic edges (IPOM plus) with sutures through the abdominal wall. These will be placed just as in open surgery with a 1

cm step and a 1 cm parietal load. At the skin level, several incisions will be made along the parietal defect by which, by means of the Reverdin needle, the threads passed through both edges of the parietal defects will be pulled. Of course, the ligature of the transparietal threads is done with the exsufflated abdomen. The defects of up to 6 cm in cross-section are suitable for such a suture. Instead, in large parietal defects, the technique of separating the components is required, which allows the aponeurotic margins to be brought to the median line by about 10 cm on each side

➔ **Prosthesis of the Abdominal Wall**

The mesh shall be sized so as to exceed the margins of the parietal defect by 5 cm on either side. If the mesh is rectangular, it is preferred to round the edges, as this allows better mesh placement on the abdominal wall, and also reduces the number of tacks needed to fix the mesh. The mesh should be marked on the side that comes in contact with the abdominal viscera because once inserted into the peritoneal cavity, only one of the two sides of the mesh can be seen. Marking the mesh helps us to get it in the right position. Also additional help is provided by marking the cardinal points that will also represent the transperitoneal fixation of the mesh. These markings must overlap with the markings on the skin to make sure the mesh is in the correct position. The mesh is rolled through the 10 mm trocar. For larger sized meshes there is use of 12/15 mm trocars or the mesh will be pulled with an atraumatic grasper externalised through a contralateral trocar, which is then removed allowing the mesh to pass through the abdominal wall. Mark the mesh on the side to be in contact with the viscera, then fix it, first in the cardinal points with transparietal threads. Transfascial threads for the support of the mesh should be ligated so that there is no space between the prosthesis and the abdominal wall not to interfere with the epiploon at this level or an intestinal loop. These will be in total transabdominal plane, through a few skin incisions placed at the cardinal points, with the help of the Reverdin needle as well as the restoration of the white line The mesh is then fixed with the help of tacks (titanium or absorbable) applied

circumferentially, in the single or double crown approximately 5 on each edge. If the surgical team is on the left side, then the fixing of the mesh at this level is made by a trocar inserted contralaterally into the right hypochondrium. To have a more perpendicular layout of the tacks, exert pressure from the outside on the abdominal wall at the point of tacks pulling. Achieving the perpendicularity between the application device and the abdominal wall provides a deeper penetration of the tacks and thus safer fixation of the prosthesis. The fastening of the mesh will always be at a pressure of 5-7 mmHg. The intervention is finished by peritoneal cavity inspection for bleeding sources or possible intestinal lesions followed by CO2 exsufflation and suture of the skin wounds. If at the place of the transfascial fixation of the mesh there is skin retraction due to the suture node, the skin should be released by exerting a vertical traction by means of a surgical forceps. It is not necessary to close the parietal incision from level of the 10 mm trocar, because after exsufflation, the incision will move to the left costal margin. The skin is sutured with 4-0 separate threads. Intraperitoneal drainage for 24-48 hours is the surgeon's option.

➔ **Postoperative Follow-Up.**

The postoperative strategy is similar to that of other laparoscopic surgeries. Vital functions (cardiac, pulmonary, renal) will be monitored. Particular attention is paid to postoperative analgesia, especially in the first 24-48 hours. Injectable and then oral anti-inflammatory medication will be administered to ensure patient comfort. The belly band will be applied from the operating room to prevent the occurrence of the postoperative seroma. Depending on the severity of the adhesion syndrome and extensive adhesiolysis to intestinal loops, patients will have nasogastric intubation that is maintained until resumption of bowel movement. Oral feeding is resumed after the bowel movement starts. Liquid food showed be given at first, then normal food. Patient extermination will be based on his clinical status. The vast majority can drive the car from the first week after surgery and the resumption of work is done on average in 2 weeks. Alteration in general condition, fever, leukocytosis, tachycardia and acute meteorism may indicate an

enteral fistula. Ultrasonography, computed tomography can indicate the presence of intraperitoneal fluid confirming the diagnosis of peritonitis. In uncertain cases, laparoscopy determines the diagnosis.

Advantages of Defect Closure [42]

Because defect closure reduces the hernia width a smaller mesh can theoretically be used. A generous overlap of at least a 5 cm is still recommended. Therefore, with defect closure at least a 10–12 cm wide mesh is still required. Reduced implanted foreign body theoretically reduces fibrosis, scar plate formation, and visceral exposure to synthetic materials, all of which may impact patients' symptoms and mobility. While it is unclear what the true clinical significance in the long term is as there is limited data thus far. The benefit of reduced recurrence rate has not been completely elucidated for laparoscopic defect closure due to the lack of any randomized trials and only a small number of comparative studies, however, recent data is encouraging. In their review paper of the 11 studies involving LVHR with defect closure Nguyen et al. describe recurrence rates of 0–7.7 %.[43] Three of those studies retrospectively compared closure vs. non-closure and discovered significant reductions in recurrence rates, with recurrence rates of 0–5.7 % for defect closure, compared to a range of 4.8–16.7 % for traditional bridged LVHR.[44-46] Newer retrospective studies display conflicting results for laparoscopic defect closure, with one study demonstrating favorable recurrence and wound morbidity in a large cohort of 1326 patients [47], while another study showed similar results in groups with or without defect closure.[48] Additional benefits of laparoscopic defect closure are based on obliteration of the dead space that is typically present in traditional bridged LVHRs. Reduction of the dead space results in decreased seromas and potential infectious complications of seromas. A cohort of 47 patients was described that underwent laparoscopic shoelace closure, none of whom returned with seroma or hernia recurrence.[49] Likewise, all other studies with the exception of one demonstrate low seroma rates, ranging from 0 to 11.4 %.[43] Comparatively, LVHR without defect closure results in seroma rates of up to 32 %, though many are not

clinically significant.[43,50] Additionally, if wound infections should arise requiring wound opening or if the skin dehisces, defect closure provides an additional barrier of tissue above the mesh, thus limiting mesh exposure and possible contamination or infection. Finally, defect closure may offer a cosmetic advantage in the long term. While initial postoperative wounds tend to demonstrate bunched up tissue under the skin, the lax tissues anterior to the defect tend to tighten up as myofibroblast contraction takes place, resulting in a reduction in subjective bulging and more cosmetically appealing repair.

Disadvantages of Defect Closure

Any technique that is novel or without randomized trials has its potential shortcomings, and not every patient is a candidate for laparoscopic defect closure. First, defect closure can result in significant fascial tension. While trans-abdominal buttressing sutures are routinely placed to offload tension onto the mesh for larger defects, closure of abdominal wall defects without significant laxity may result in excessive tension. This fascial strain may result in fascial dehiscence and possible hernia recurrence if insufficient mesh overlap exists. Also, because of the increased need for permanent trans-abdominal sutures there lies a greater risk for suture granuloma formation and possible suture abscess. It is, therefore, important to ensure all sutures are tied down appropriately and buried deeply within the subcutaneous tissue to reduce abscesses. Cosmetically, initial postoperative wounds may display signs of bunched up tissue over the repair. As discussed above, while this typically flattens out over time, it should be noted cosmetic benefits might not be apparent for weeks to months following repair. Intraoperatively, there is an increased risk of bowel injury, as viscera can become entrapped within the hernia sac and sutures. Astute attention is required to reduce visceral entrapment. One of the possible strategies is to tie the knots down under direct visualization using low insufflation pressures. Finally, defect closure can result in significant postoperative pain as a result of fascial tightening as well as additional trans-abdominal sutures. Therefore, adequate multimodal analgesia is an essential part of postoperative management

Complications and Outcomes

While LVHR has its benefits with relation to wound morbidity compared to open techniques, it is not without potential complications. In general, these complications can be categorized into intra-operative, postoperative, and long-term. Some complications are associated with laparoscopy and some with ventral hernia repair; the following discussion focuses on complications that are somewhat unique to LVHR. Wound and mesh infections are known complications of any hernia repair. Many investigators have shown that laparoscopy is associated with an extremely low rate of wound infections and very rare mesh infections. Modern meshes without an ePTFE component have reduced infectious complications of LVHR even further. However, any persistent cellulitis and/or persistent fluid collection around the intra- peritoneal mesh should be a point of concern for acute or chronic prosthetic infection, especially if ePTFE-based mesh was used. Open exploration, mesh removal, primary hernia repair, and delayed formal reconstruction are the best and safest ways to approach infected mesh after LVHR. Intra-operative complications such as bleeding or injury to surrounding intra-abdominal structures are rare. Nonetheless, an enterotomy or missed enterotomy will significantly impact the outcome of surgery. An enterotomy identified during surgery with spillage of enteric content within the abdomen should cause the surgeon to re-evaluate the operative plan. The enterotomy can be repaired laparoscopically if it is well visualized and ports are optimally placed. If there is any question about the integrity of laparoscopic repair of the enterotomy, conversion to a laparotomy is mandatory. With gross spillage of enteric content, a formal hernia repair should be delayed. Missed enterotomy or a delayed bowel injury from electrocautery resulting in intra- abdominal sepsis and mesh infection would require laparotomy, repair of the bowel injury, and complete excision of the mesh. Failure to completely remove the mesh would almost certainly lead to persistent intra-abdominal infection. Seroma formation is one of the most common complications after LVHR. Failure to obliterate the potential space within the hernia sac frequently leads to fluid

accumulation in the hernia sac. The seroma may present as a bulge which patients may commonly perceive as a hernia recurrence. Careful physical exam should easily differentiate between the two. If the diagnosis is in question, ultrasound or CT scan evaluation can be used to differentiate between diagnoses. Management of a seroma should follow conservative pathway as it will typically resolve without intervention. For persistent seromas, sterile aspiration can be performed in the office. However, fluid may re-accumulate in the potential space after aspiration necessitating additional aspirations. It is important to realize that any aspiration and subsequent aspirations put a patient at risk for converting a sterile seroma into an abscess. Closing the defect during LVHR can significantly reduce or even eliminate the risk of seroma formation. In the early postoperative period, patients may complain of pain at the trans-abdominal suture sites. Conservative management with NSAIDs may resolve the patient's pain; however, persistent pain may require injection with local anesthetics. The use of slowly absorbable sutures for mesh fixation could be associated with reduced postoperative pain, but that has not been proven in prospective trials. While the use of absorbable tacks has been proposed to reduce chronic pain, their utilization has been shown to have no effect on postoperative pain. Arguably, the most important complication from an LVHR is a hernia recurrence, as this is the primary outcome measure of long-term success of the surgery. Recurrence rates in the literature vary from 2 to 20% with the largest series demonstrating recurrence rates around 5%. Long-term, the best chance for a successful LVHR without recurrence, in our opinion, is to maximize coverage of the hernia defect and securely fixate the mesh to the abdominal wall with both tacks and trans-abdominal sutures. Any technique that is novel or without randomized trials has its potential shortcomings, and not every patient is a candidate for laparoscopic defect closure. First, defect closure can result in significant fascial tension. While trans- abdominal buttressing sutures are placed to offload tension onto the mesh, closure of large defects or abdominal walls without significant laxity may result in excessive tension. This

fascial strain may result in fascial dehiscence and possible hernia recurrence if insufficient mesh overlap exists. Also, because of the increased need for permanent trans-abdominal sutures, there lies a greater risk for suture granuloma formation and possible suture abscess. It is, therefore, important to ensure all sutures are tied down appropriately and buried deeply within the subcutaneous tissue to reduce abscesses. Cosmetically, initial postoperative wounds may display signs of bunched up tissue over the repair. As discussed above, while this typically flattens out over time, it should be noted cosmetic benefits might not be apparent for weeks to months following repair. Intraoperatively, there is an increased risk of bowel injury as viscera can become entrapped within the hernia sac and sutures. Astute attention is required to reduce visceral entrapment. One of the possible strategies is to tie the knots down under direct visualization using low insufflation pressures. Finally, defect closure can result in significant postoperative pain as a result of fascial tightening as well as additional trans- abdominal sutures. Therefore, adequate multimodal analgesia is an essential part of postoperative management

Zeichen et al.[46] performed a retrospective study of patients who underwent laparoscopic ventral hernia repair for small and medium sized hernia between July 2000 and September 2011. The study compared non closure (n = 93) to closure of the primary fascia (n = 35). The mean follow-up period was 26 months (1–108 months). The study used both percutaneous (n = 18) and intracorporeal (n = 17) closure of the defect. The primary end point was recurrence. The non closure group had 15.1 % recurrence rate. Two cases of recurrence appeared in the percutaneous closure group. The seroma formation rate was 4.3 % in the non closure group and 11.4 % in the closure group. The study did not report a definition for the outcomes and reported a need of larger study with longer follow up to demonstrate clinical significance.

Banerjee et al [44] reported a retrospective study that compared non-closure (n = 126) to closure (n = 67) of the defect. The mean follow-up period was 10.5 months (1–36 months). The follow-up period was the

shortest of the three comparative studies. The recurrence rate was 4.8% in the non-closure group and 3.0% in the closure group.

Clapp et al [45] reported a retrospective study that examined the outcomes of defect closure. It was the only study that was risk-adjusted with minimum follow-up criteria. The median follow-up period was 24 months (7–34 months). In the non closure group (n = 36), the recurrence rate was 16.7%. The closure group (n = 36) experienced no recurrences. Bulging rate was 69.4% in the non closure group and 8.3% in the closure group. SSI rate was 13.9% in the non closure group and 8.3% in the closure group. Seroma formation rate was 27.8% in the non closure group and 5.6% in the closure group. Clapp et al. also reported on patient-centered outcomes. The mean ± SEM patient satisfaction and functional status rates were higher in the closure group than in the non closure group: 8.8 ± 0.4 vs. 7.1 ± 0.5 and 79 ± 2 vs. 71 ± 2, respectively. Patient satisfaction was based on a 10-point Likert-type scale, with indicating least satisfied and 10 most satisfied. Functional status was assessed using the Activities Assessment Scale (AAS). The case control groups were well matched. There was no difference in hernia size, hernia type, mesh type, use of permanent sutures, or prior surgical histories between the two study cohorts. The LVHR-TCCD patients developed significantly fewer seromas, less ME, less TE, less clinical eventration and fewer recurrences compared to the sLVHR case–control patients. Patient overall satisfaction, cosmetic satisfaction and AAS functional status scores were superior.

Nguyen et al (2014) [43] in Primary Fascial Closure with Laparoscopic Ventral Hernia Repair: Systematic Review concludes that closure with laparoscopic ventral hernia repair appears promising. Indeed, its use may result in lower rates of eventration (bulging), recurrence, and seroma formation. Also, patients appear to be more satisfied with the results and have improved functional status compared to a bridged repair. This particular study has tabulated various studies about various closure techniques and study design and outcomes later described below And in its later discussion it quotes that primary fascial closure

during laparoscopic ventral hernia repair with mesh showed promising results. The results of this review have important clinical implications. Fascial closure techniques with subsequent mesh fixation have lower recurrence rates and seroma formation than hernia repairs that bridge the fascial defect. A randomized controlled trial to evaluate the role of closure of the central defect during laparoscopic ventral hernia repair is warranted (n = 20 for eventration or n = 220 for recurrence, a = 0.05, b = 0.20). The technique that should be examined in the trial should include intracorporeal closure using non-absorbable suture.

Agarwal et al [51] published that Between April 2004 and June 2006, 29 ventral hernia patients were enrolled without any exclusion. All patients had LVHR performed with defect closure technique. Mean operative time and hospital stay were 65 min and <1 day, respectively. They stated that there were no perioperative complications, conversion, infection, trocar site or recurrent herniation or mortality, postoperative visible bulge.

Chelala et al (2015) [52] in Long-term outcomes of 1326 laparoscopic incisional and ventral hernia repair with the routine suturing concept: a single institution experience proves effectively that closing the defect (suturing concept) confers additional benefits to the conventional advantages of LIVHR, in terms of reducing the overall morbidity, absence of prosthesis migration, and limited adhesions, with a low rate of recurrences.

Palanivelu et al (2006) [53] in Laparoscopic sutured closure with mesh reinforcement of incisional hernias (2006) also concluded that the closure of the defect is ideally preferred by surgeons at any given point of time and is being followed since a decade.

Gonzales et al [54] did a study and the study included 67 PCD and 67 NPCD. The descriptive statistics for baseline variables and characteristics of the hernia in both techniques, showing similarities between groups presents the descriptive statistics for the outcome variables in both groups. The total surgical time was significantly longer ($t\ (112.1df) = 2.560,\ P = 0.012$) for PCD compared with NPCD by an average of 19.7 min. There were a higher proportion of complications

and recurrences in the NPCD (complications: 10.4% vs. 3%; recurrences: 7.5% vs. 1.5% for NPCD and PCD, respectively).

Yoshikawa et al (2015) [55] stated that laparoscopic repair of incisional ventral hernia results in less blood loss than open repair of large hernias and is associated with a shorter hospital stay, less ileus and a reduced risk of wound infection.

Strey et al [56] states current IPOM techniques do not achieve closure of the midline hernia gap, thereby increasing the risk of persistent mesh bulging with poor abdominal wall function for which they proposed triple set repair and compared their outcomes.

Wennergren et al (2015) [48] published “Laparoscopic ventral hernia repair with primary fascial closure versus bridged repair: a risk-adjusted comparative study” and a multicenter, retrospective database of all ventral hernia repairs performed from 2010–2012 was accessed. Patients who underwent LVHR with mesh were reviewed. Patients who had PFC were compared to bridged repair.

Suwa et al (2015) [57] in Closure versus non-closure of fascial defects in laparoscopic ventral and incisional hernia repairs: a review of the literature actually reviewed the literature on IPOM - Plus, including the details of the surgical procedures and outcomes between 1993 and April 2015.

Suwa et al (2016) [58] in their study “Fascial defect closure with intraperitoneal onlay mesh superior to standard intraperitoneal onlay mesh for laparoscopic repair of large incisional hernia? Compared and concluded that postoperative hospital stay after sIPOM for large Incisional Hernia was significantly longer than that after IPOM-Plus. The follow-up term, however, was longer in sIPOM, as it is an older procedure; patients formerly were asked to stay in the hospital longer than they are now, which might have influenced the duration of stay. Only one recurrence was observed in the sIPOM group, but no significant difference was encountered. In LIHR, IPOM-Plus seems to be more effective than sIPOM in terms of reducing the incidence of mesh bulging.

Mitura et al (2017) [59] in their study “Outcomes of bridging versus mesh augmentation in laparoscopic repair of small and medium midline ventral hernias” implied that laparoscopic ventral hernia repair is generally safe and is associated with the low recurrence rate. A total of 783 patients were analyzed. 222 of them had their defects closed (DC), while the remaining 561 defects were not closed (NC) at the discretion/routine of the operating surgeon. After a mean follow-up of 12.1 months, the incidence of surgical site events (3.6 vs. 14.9%, $p < 0.0001$) and seromas (0.4 vs. 11.5%, $p < 0.0001$) was significantly lower in the defect closure group. Objectively confirmed recurrences were also significantly lower in the DC group (5.4 vs. 14.2%, $p = 0.003$).

Kesari et al 2016 [60] did an observational study on Closure versus non-closure of hernia defect in laparoscopic ventral mesh repair in which they took on 81 patients for laparoscopic ventral hernia repair and out of which 32 case underwent non closure and 49 cases underwent fascial closure of the defect. The former mentioned technique was shown to have associated with more chances of post-operative pain with increase in operative time but altogether lesser incidence of ileus and seroma formation as compared to non-closure of the defect.

Raja et al 2018 [61] published a research article based on A comparative study of standard ipom and ipom with closure of defect in the laparoscopic management of incisional hernias which was done in GMC Srinagar. As per the study and the article two groups of incisional hernias were assessed which included closure i.e. IPOM PLUS and non-closure i.e. IPOM and 40 patients each were assigned in each of the group. The former group seem to have lower rate of complications as compared to the latter with lower incidence of recurrence, however they instigated on large study groups to confirm the same. The study showed the comparison and data pictorial representation using size of the defect, age, complications like (seroma, ileus, recurrence and mesh bulging) and duration of hospital stay. The comparisons seemed to be more in favor of IPOM Plus.

Sadava et al in 2019 [62] did a study in which consecutive series of patients undergoing LVHR from January 2014 to June 2017 with a minimum follow-up of 6 months were included. The sample was divided into two groups: DC, patients with fascial defect closure and NDC, patients without closure of the defect. The Results depicted a total of 100 patients which were included, 51 had their defects closed (DC) and the remaining 49 patients had their defects not closed (NDC). There were no significant differences between groups regarding gender, age, smoking, body mass index, or preoperative American Society of Anesthesiologists. Defect area was similar in both groups (DC: 37 cm2 versus 42 cm2 NDC, P = .6). Patients with defect closure had significantly longer operating time (DC: 111 and NDC: 88 minutes, P < .01). Patients without defect closure showed higher rates of postoperative seroma (DC: 10% versus NDC: 18%) and bulging (DC: 4% versus NDC: 12.2%). After a mean follow-up of 24 (6–36) months, recurrence was 6% in DC and 18% in NDC (P = .07). Closure of the defect in midline hernias showed a significant reduction of the recurrence rate (DC: 2/39 [5%] versus NDC: 5/21 [24%], P = .04).Hence they drew a conclusion that. Defect closure in LVHR seems to reduce postoperative morbidity and recurrence rates, especially in midline defects.

MATERIALS AND METHODS

Cases were evaluated prospectively. IPOM-PLUS cases involve laparoscopic ventral hernia repair with fascial closure and mesh placement whereas IPOM only cases involves laparoscopic ventral hernia repair that consists of bridging repair only with mesh placement without defect closure. All cases were performed with a three-port access from the lateral abdominal wall, using a 12-mm central optical port and two 5-mm instrument ports. In cases where closure was planned and it was performed using non-absorbable sutures (1,0 prolene). The sutures were passed in barbed / v locking or self-locking manner. The sutures were tied intra-corporeally with reduced pneumoperitoneum bringing pressure upto 8 mmHg to allow an anatomical approximation of the defect. The mesh was Composite mesh manufactured for intra-peritoneal placement (Parietex Composite mesh). The mesh size was selected based on the size of the defect following defect closure which was calculated by using a sterile ruler and calculating the defect size before the closure of the defect and hence defect + 5 cm gave the mesh size for onlay technique. This step of beforehand calculation favors the fact that if closure of defect; by any chance does not work i.e. opens up; the extra coverage had enough area to cover the defect. Fixation was performed using absorbable tacks in a double crown technique. Follow-up was done in the outpatient department post-operatively. Patients were evaluated for post-operative complications, recurrence and chronic pain.

Source of data

This prospective study of 1 year for hernia repair by IPOM-Plus was conducted in General Surgery Department of Dayanand Medical College & Hospital, Ludhiana during January 2018 to December 2018 and outcome was compared with the data collected for hernia repairs done by using IPOM technique during January 2017 to December 2017.

Inclusion criteria:

- Subjects 18 years of age or older

- All adult patients undergoing laparoscopic mesh repair of abdominal wall hernia including ventral and incisional hernias, of any etiology.
- Consent to participate in study

Exclusion criteria:

- ASA class IV or V (severe co-morbid conditions)
- Contra indications for anesthesia and surgery.
- Complicated hernias (obstructive : strangulated)
- Lumbar hernias
- Very large hernia (size > 8 cm)
- Combined abdominoplasty
- Morbid obesity

METHOD OF COLLECTION OF DATA

1. Inclusion and exclusion criteria was applied to patients presenting to the Dayanand Medical College Hospital, Ludhiana only.
2. Patients were educated about the study and only those patients consenting to participate in the study were included. Written informed consent were taken from every participant included in the study.
3. Database collection included documentation of medical history, age, sex, pre hospital interval, vital signs, abdominal signs and drug history.
4. Routine investigations done such as hemogram, RFT, amylase, lipase, chest X-ray, ultrasound abdomen, (CECT abdomen was done when needed).
5. Regular monitoring of the patients with hemogram, RFT, amylase, lipase, chest X-rays were done.
6. Intra – operative complications, need for open repair or any other complication were documented.
7. Patient were assessed for Short term complications like surgical site infection, wound dehiscence, seroma/ haematoma, bowel complications, need for re-surgery, duration of hospital stay & post – operative pain; and long term complications like recurrence at 3

months, seroma/ haematoma, mesh infection, chronic pain, adhesive intestinal obstruction, enterocutaneous fistulae and need for re surgery.

8. Stay of the patient in ward were noted in days.
9. Follow up after discharge was done at intervals of 2 weeks, 1 month and 3 months.
10. Data collected from the previously done hernia repair by IPOM technique through January 2017 to December 2017.

DURATION OF STUDY

- 1 year
- 1st January 2018 to 31st December 2018

OUTCOME

1. Intra-operative complications
2. Post-operative complications

STATISTICAL ANALYSIS

Data were described in terms of range; mean ±standard deviation (± SD), median, frequencies (number of cases) and relative frequencies (percentages) as appropriate. Comparison of quantitative variables between the study groups was done using Student t-test. For comparing categorical data, Chi square ($\chi 2$) test was performed and exact test was used when the expected frequency is less than 5. A probability value (p value)less than 0.05 was considered statistically significant.All statistical calculations were done using SPSS (Statistical Package for the Social Science) SPSS 21 version statistical program for Microsoft Windows.

OBSERVATION AND RESULTS

This prospective study of 1 year for hernia repair by IPOM-Plus (Group-A) was conducted in General Surgery Department of Dayanand Medical College & Hospital, Ludhiana during January 2018 to December 2018 and outcome was compared with the data collected for hernia repairs done by using IPOM technique (Group-B) during January 2017 to December 2017. Total 50 patients were included in the study during this time period, out of which 25 patients were classified as Group A and underwent IPOM-PLUS repair of hernia whereas rest of 25 patients were classified as Group-B and underwent IPOM repair of hernia.

1. AGE GROUPS

Table 1. Distribution of the study groups according to age group

	GROUP A (IPOM PLUS)		GROUP B (IPOM)		
AGE GROUPS (IN YEARS)	NUMBER OF CASES	%	NUMBER OF CASES	%	TOTAL
< 40	8	32%	9	36%	17
41-60	11	44%	10	40%	21
> 60	6	24%	6	24%	12

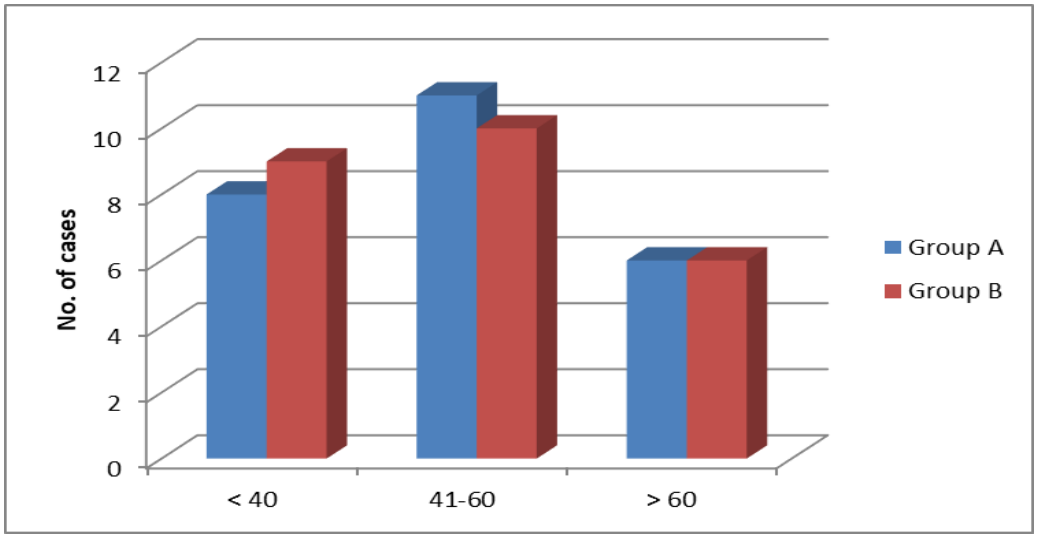

Figure 1. Distribution of the study groups according to age group

Most of the patients in this study were in the age group of 41-60 years with mean age of 49.40 years in Group A and 50.28 years in Group B.

2. GENDER

Table 2. Distribution of the study groups according to sex

SEX	GROUP A (IPOM-PLUS)		GROUP B (IPOM)		TOTAL
	NUMBER OF CASES	%	NUMBER OF CASES	%	
FEMALE	13	52 %	11	44 %	24
MALE	12	48 %	14	56 %	26

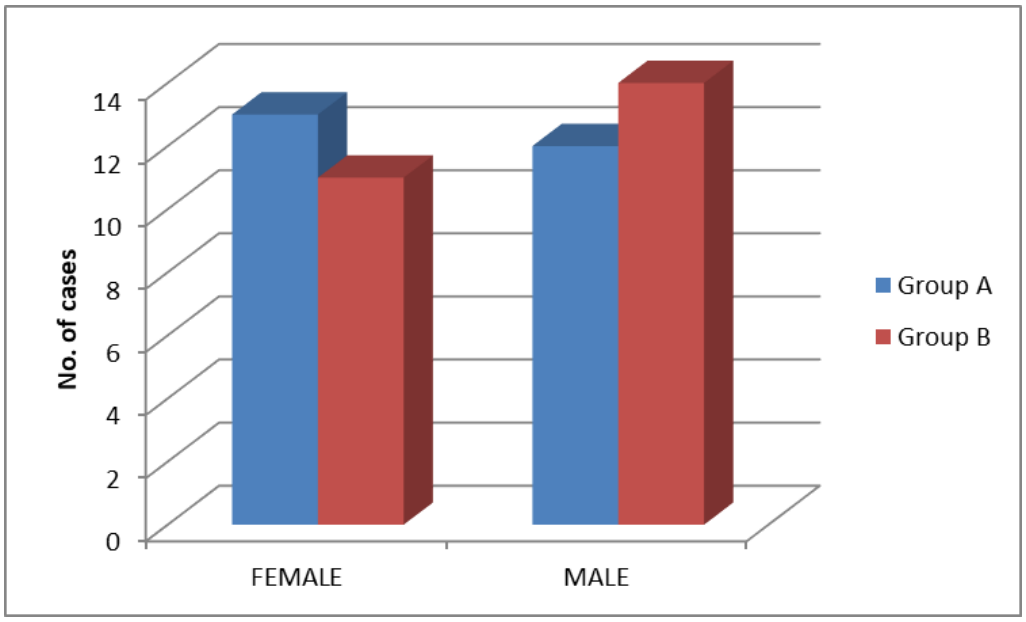

Figure 2. Distribution of the study groups according to sex

Total 50 patients were included in this study, out of which 52% were males and 48 % were females.

3. DURATION OF SYMPTOMS

Table 3. Distribution of the study groups according to duration of symptoms

DURATION OF SYMPTOMS	GROUP A (IPOM-PLUS)		GROUP B (IPOM)		TOTAL
	NUMBER OF CASES	%	NUMBER OF CASES	%	
LESS THAN 1 YEAR	12	48%	13	52%	25
MORE THAN 1 YEAR	13	52%	12	48%	25

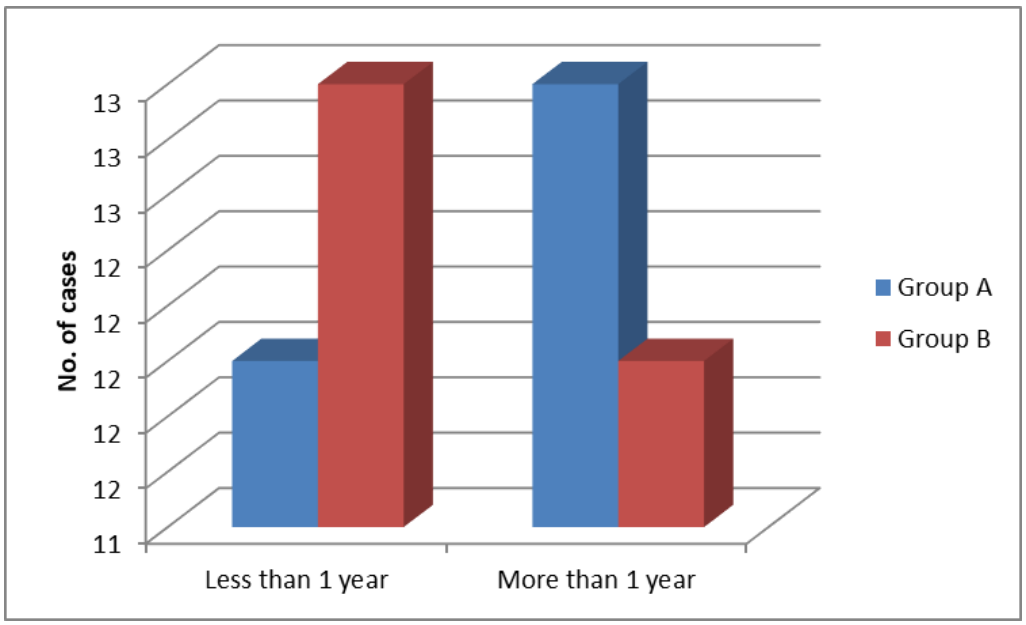

Figure 3. Distribution of the study groups according to duration of symptoms

Among the patients in the study, 50% of the patients presented within one year and rest 50% of patients presented after 1 year of onset of symptoms.

4. BMI

Table 4. Distribution of the study groups according to BMI (KG/M2)

MEAN BODY MASS INDEX (BMI) IN KG/M2	GROUP-A (IPOM-PLUS)	GROUP-B (IPOM)
	30.5	30.9

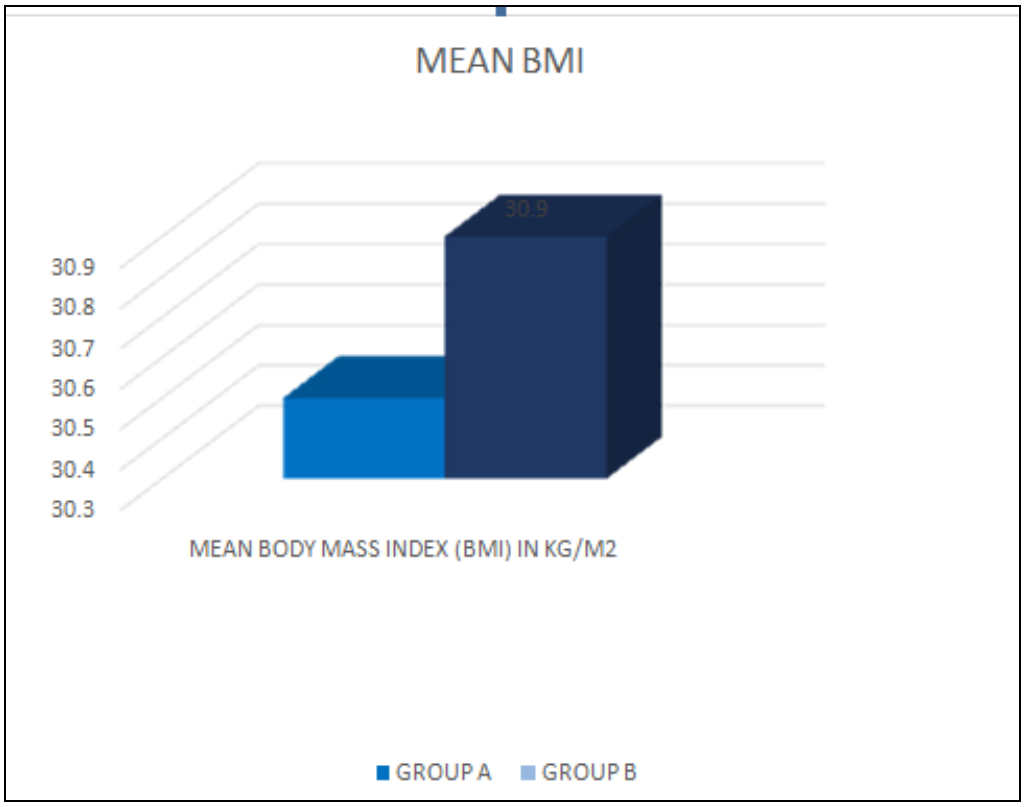

Figure 4. Distribution of the study groups according to BMI (KG/M2)

The mean body mass index of patients in Group A was 30.5 kg/m2 and mean body mass index of patients in Group B was 30.9kg/m2.

5. COMORBIDITIES

Table 5. Distribution of the cases according to comorbidities

COMORBIDITIES	NUMBER OF CASES	%
DIABETES	4	8.0 %
HYPERTENSION	9	18.0 %
CARDIOVASCULAR	1	2.0 %
MALIGNANCY	1	2.0 %
OTHERS*	1	2.0 %

*Others Includes Chronic Kidney Disease

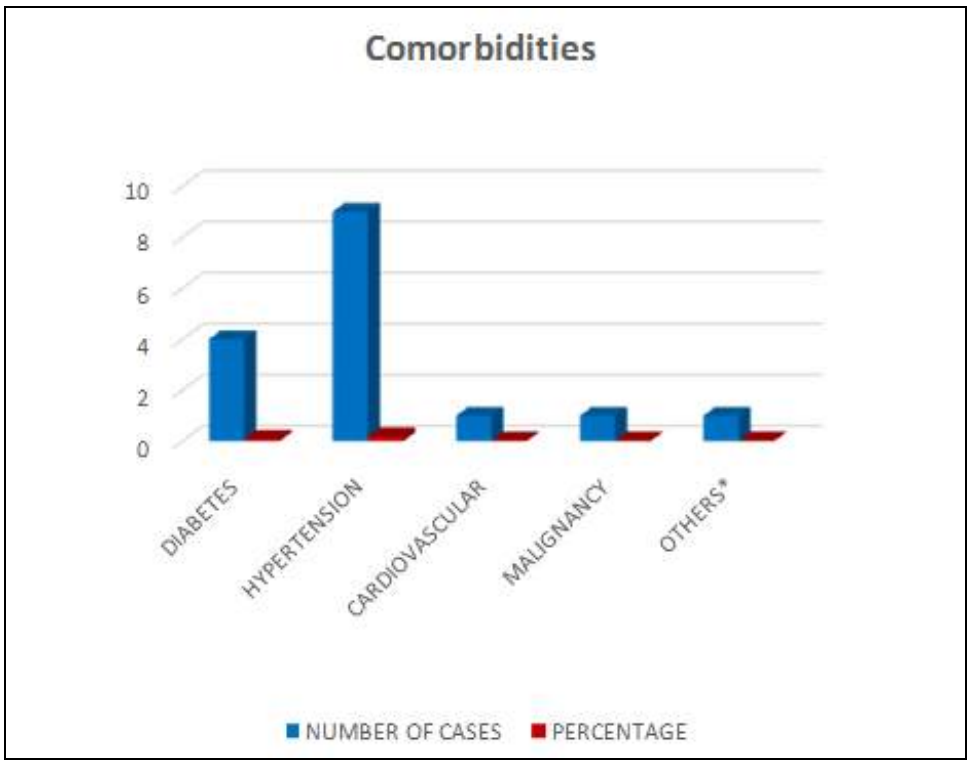

Figure 5. Distribution of the cases according to comorbidities

6. HISTORY OF PREVIOUS SURGERY

Table 6. Distribution of the number of cases according to previous surgical history

HISTORY OF PREVIOUS SURGERY	NUMBER OF CASES	%
YES	13	26.0%
NO	37	74.0%

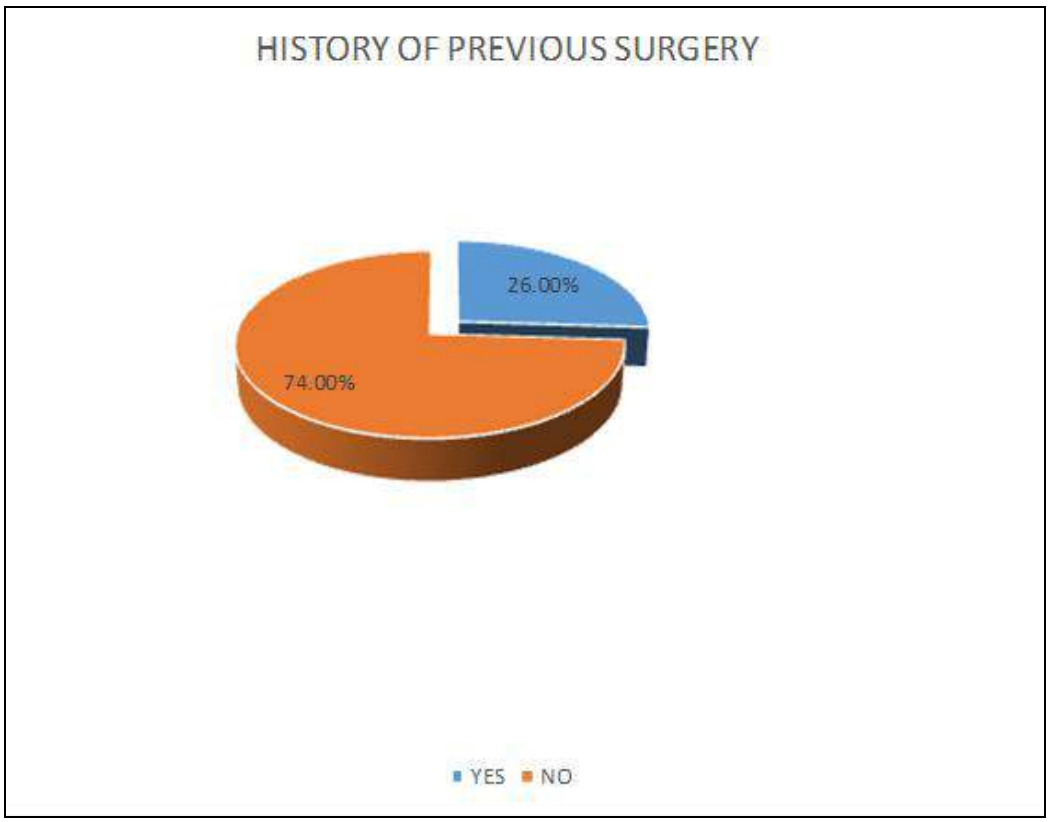

Figure 6. Distribution of the number of cases according to previous surgical history

13 out of 50 patients (26%) has history of previous surgery

7. DEFECT SIZE OF HERNIA

Table 7. Distribution of the study groups according to defect size

MEAN DEFECT SIZE (IN CENTIMETRES)	GROUP A (IPOM-PLUS)	GROUP B
	3.26	3.14

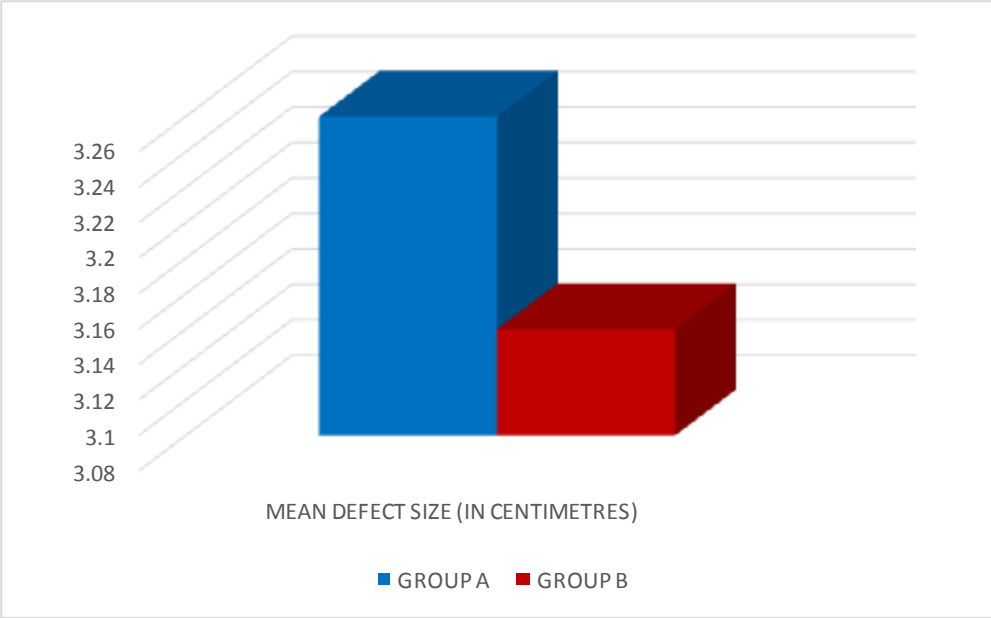

Figure 7. Distribution of the study groups according to defect size.

Mean defect size of hernia in Group A was 3.26 cms and Group B was 3.14 cms.

7. CONTENTS OF HERNIAL SAC

Table 8. Distribution of the study groups according to contents of hernial sac

CONTENTS	NUMBER OF CASES	%
OMENTUM ONLY	40	80%
SMALL BOWEL	7	14%
LARGE BOWEL	1	2%
BOTH SMALL AND LARGE BOWEL	2	4%

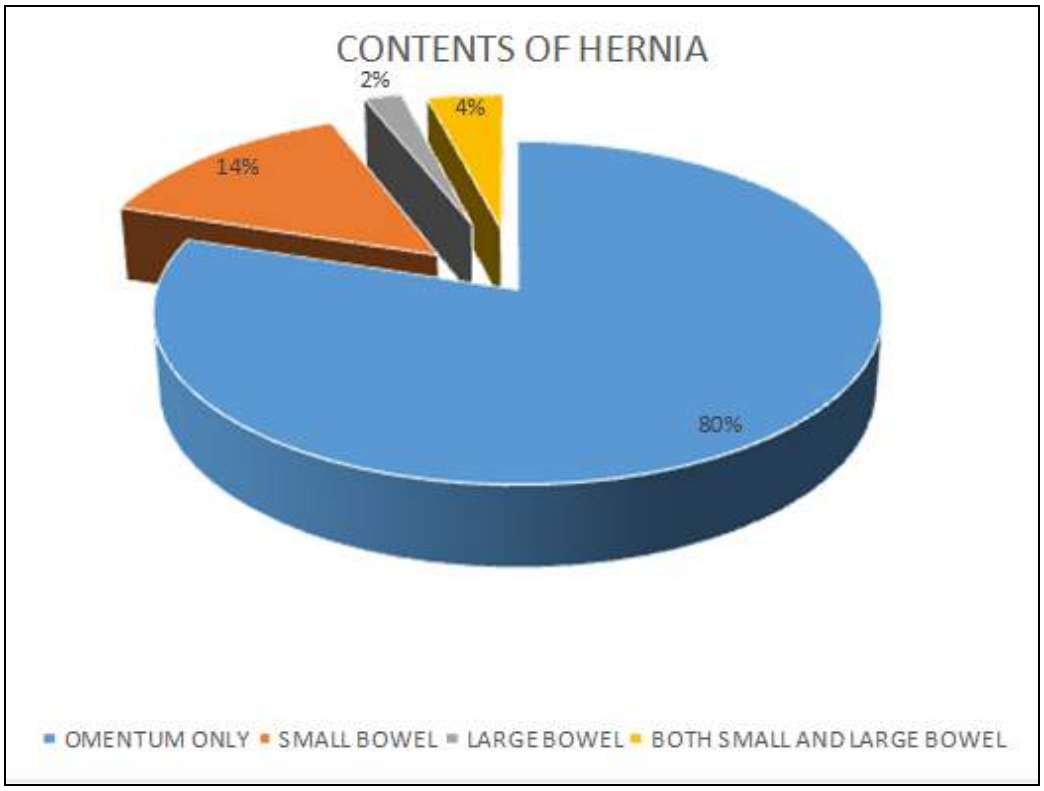

Figure 8. Distribution of the study groups according to contents of hernial sac.

Majority of the patients had only omentum as the content (80%), this was followed by small bowel and least number (2%) of patients had only large bowel.

9. OPERATIVE PROCEDURE –

- Mesh repair – 100% of patients, including patients undergoing IPOM- Plus and IPOM, underwent mesh repair with the placement of a Parietex composite mesh.
- Need of open repair - none of the patients undergoing IPOM- Plus and IPOM needed conversion to an open procedure intra-operatively.
- Drains - no drains were placed in any of the patients included in the study
- Intraoperative complication - none of the patients had any intraoperative complications.

11. DURATION OF SURGERY

Table 9. Distribution of the study groups according to duration of surgery.

Mean duration of surgery in minutes	GROUP A (IPOM-PLUS)	GROUP B (IPOM)
	112.8	102.0

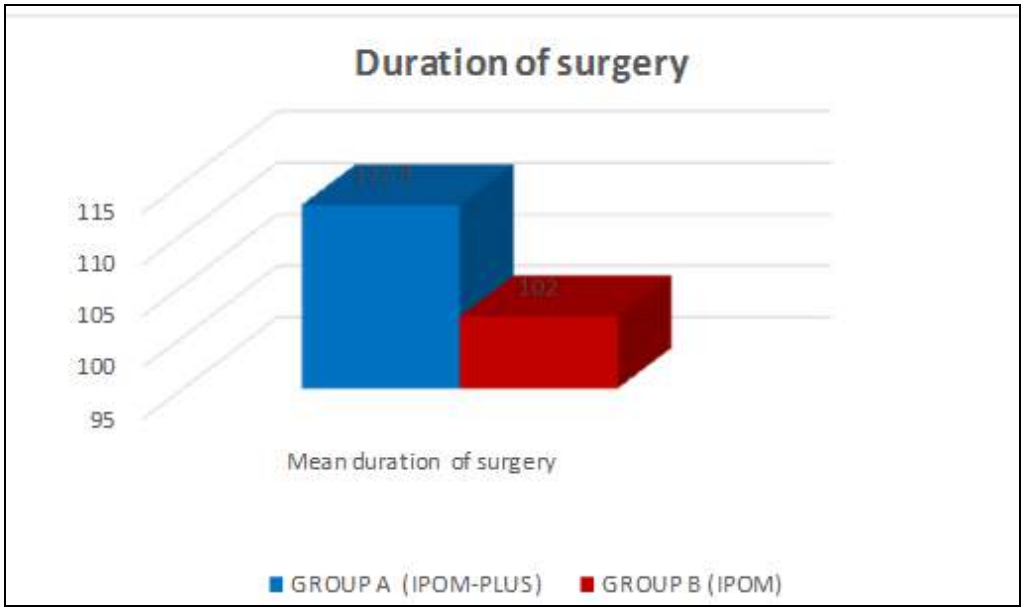

Figure 9. Distribution of the study groups according to duration of surgery.

Mean duration of surgery in IPOM plus group was 112.8 minutes and 102 minutes in IPOM group which was statistically not significant.

11. POST OPERATIVE PAIN SEVERITY

SEVERITY OF PAIN AS PER VISUAL ANALOGUE SCALE (VAS)

Table 10. Distribution of the study groups according to severity of pain as per visual analogue scale (0-10)

		GROUP A (IPOM PLUS)		GROUP A (IPOM)		
	Score	Number Of Cases	%	Number Of Cases	%	Total
SEVERITY OF PAIN AS PER VISUAL ANALOGUE SCALE (VAS)	0	0	0%	0	0%	0
	1	7	28%	3	12%	10
	2	6	24%	10	40%	16
	3	8	32%	7	28%	15
	4	3	12%	4	16%	7
	5	1	4%	1	4%	2
	6	0	0%	0	0%	0
	7	0	0%	0	0%	0
	8	0	0%	0	0%	0
	9	0	0%	0	0%	0
	10	0	0%	0	0%	0

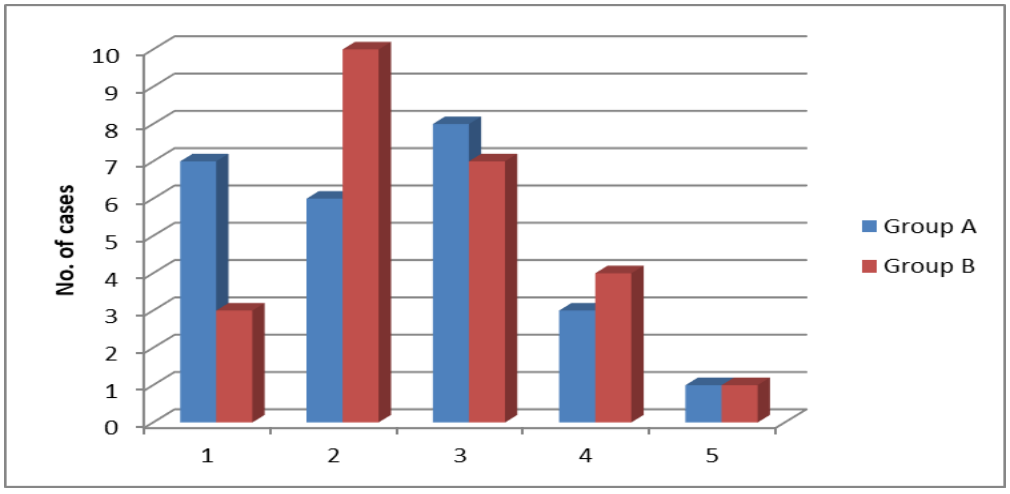

Figure 10. Distribution of the study groups according to severity of pain as per visual analogue scale (0-10)

Severity of pain in post-operative period in Group A, most of the patients (32%) scored 3 out of 10 on visual analogue scale and in Group B, most of patient (40%) scored 2 out of 10 as per visual analogue scale.

12. DURATION OF HOSPITAL STAY

Table 11. Distribution of the study groups according to duration of hospital stay in days

MEAN DURATION OF HOSPITAL STAY IN DAYS	GROUP A (IPOM-PLUS)	GROUP B (IPOM)
	5.20	4.80

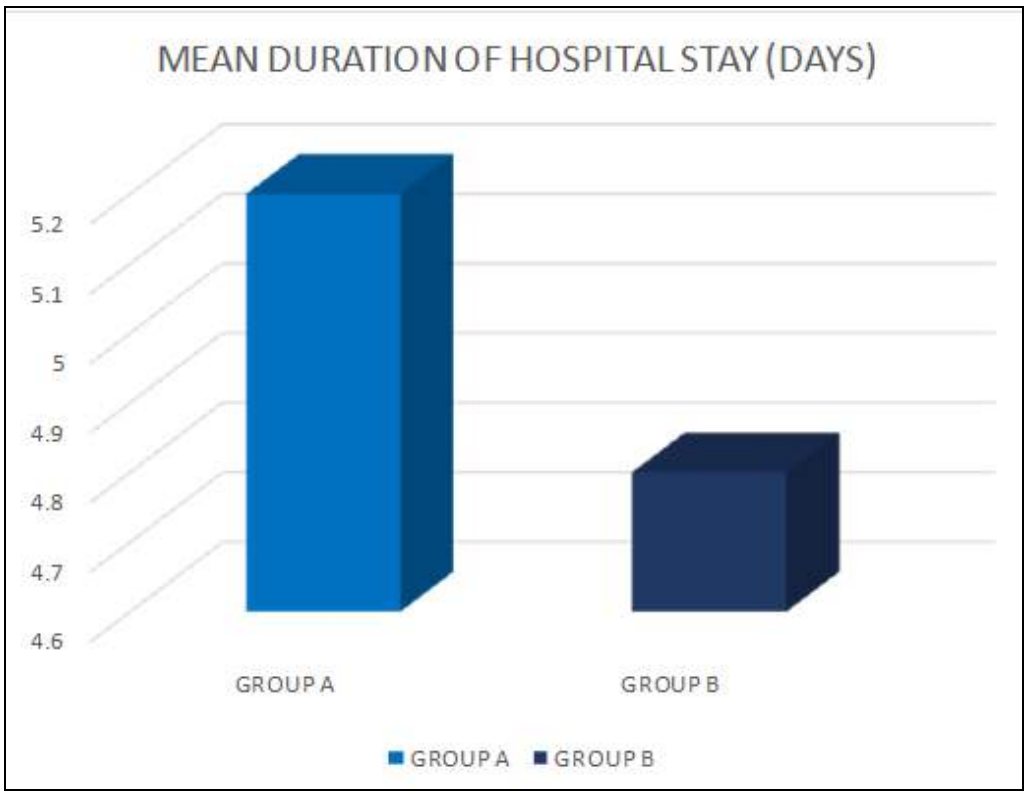

Figure 11. Mean Duration of Hospital stay in number of days.

The mean duration of hospital stay for patients included in Group A was 5.20 days as compared to 4.80 days in Group B.

13. TIME TO RETURN TO WORK

Table 12. Distribution of the study groups according time to return to work

MEAN TIME TO RETURN TO WORK IN DAYS	GROUP A (IPOM-PLUS)	GROUP B
	16.20	17.12

Figure 12. Mean time taken to return to work by patients in both study groups.

The mean time taken to return to work by patients in Group A was 16.20 days as compared to 17.12 days in Group B.

14. POST OPERATIVE COMPLICATIONS

14.1 GROUP A (IPOM PLUS)

Table 13. Distribution of the post-operative complications For Group - A at duration of 2 weeks, 1 month and 3 months

COMPLICATION	AT 2 WEEKS	AT 1 MONTH	AT 3 MONTHS
HEMATOMA/SEROMA FORMATION:	NONE	NONE	NONE
SURGICAL SITE INFECTION:	NONE	NONE	NONE
WOUND DEHISCENCE:	NONE	NONE	NONE
BOWEL COMPLICATIONS:	NONE	NONE	NONE
NEED FOR RE SUREGERY:	NONE	NONE	NONE
MESH INFECTION:	NONE	NONE	NONE
RECURRENCE:	NONE	NONE	NONE
CHRONIC PAIN:	4 CASES	3 CASE	3 CASES
ADHESIVE INTESTINAL OBSTRUCTION:	NONE	NONE	NONE
ENTEROCUTANEOUS FISTULAE:	NONE	NONE	NONE

14.2 GROUP B (IPOM)

Table 14. Distribution of the post-operative complications For Group - B at duration of 2 weeks, 1 month and 3 months

COMPLICATION	AT 2 WEEKS	AT 1 MONTH	AT 3 MONTHS
HEMATOMA/ SEROMA FORMATION:	6 CASES	3 CASE	1 CASES
SURGICAL SITE INFECTION:	6 CASES	NONE	NONE
WOUND DEHISCENCE:	NONE	NONE	NONE
BOWEL COMPLICATIONS:	NONE	NONE	2 CASES
NEED FOR RE SUREGERY:	NONE	NONE	NONE
MESH INFECTION:	NONE	NONE	NONE
RECURRENCE:	NONE	NONE	NONE
CHRONIC PAIN:	NONE	NONE	NONE
ADHESIVE INTESTINAL OBSTRUCTION:	NONE	NONE	4 CASES
ENTEROCUTANEOUS FISTULAE:	NONE	NONE	NONE

Table 15. Distribution of the study groups according to Hematoma / Seroma formation – at 2 weeks, 1 month and 3 months

HEMATOMA/ SEROMA FORMATION		NO. OF CASES IN GROUP–A (IPOM PLUS)	NO. OF CASES IN GROUP–B (IPOM)	Total	Chi-square value	p-value
AT 2 WEEKS	NO	25	19	44	6.818	0.022
	YES	0	6	6		
AT 1 MONTH	NO	25	22	47	3.191	0.235
	YES	0	3	3		
AT 3 MONTHS	NO	25	24	49	1.021	0.312
	YES	0	1	1		

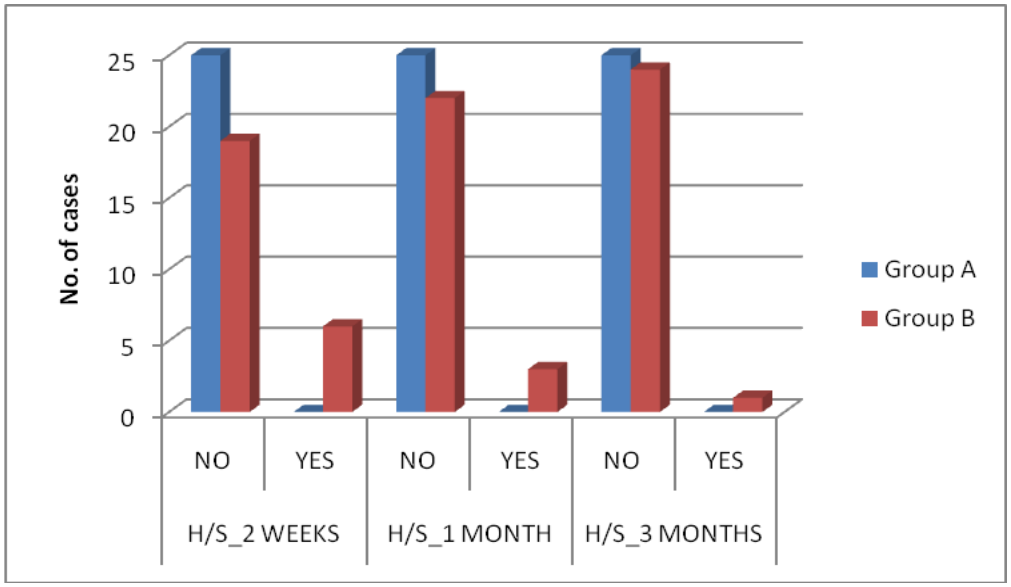

Figure 13. Distribution of the study groups according to Hematoma / Seroma formation – at 2 weeks, 1 month and 3 months

Hematoma/ Seroma formation at 2 weeks, 1 month and 3 months follow up concluded with observation of 24%, 12% and 4% patients respectively in Group B as compared to none of the patients in Group A.

Table 16. Distribution of the study groups according to surgical site infections at 2 weeks, 1 month and 3 months

SURGICAL SITE INFECTION		NO. OF CASES IN GROUP–A (IPOM PLUS)	NO. OF CASES IN GROUP–B (IPOM)	Total	Chi-square value	p-value
AT 2 WEEKS	NO	25	19	44	6.818	0.022
	YES	0	6	6		
AT 1 MONTH	NO	25	25	50		
	YES	0	0	0		
AT 3 MONTHS	NO	25	25	50		
	YES	0	0	0		

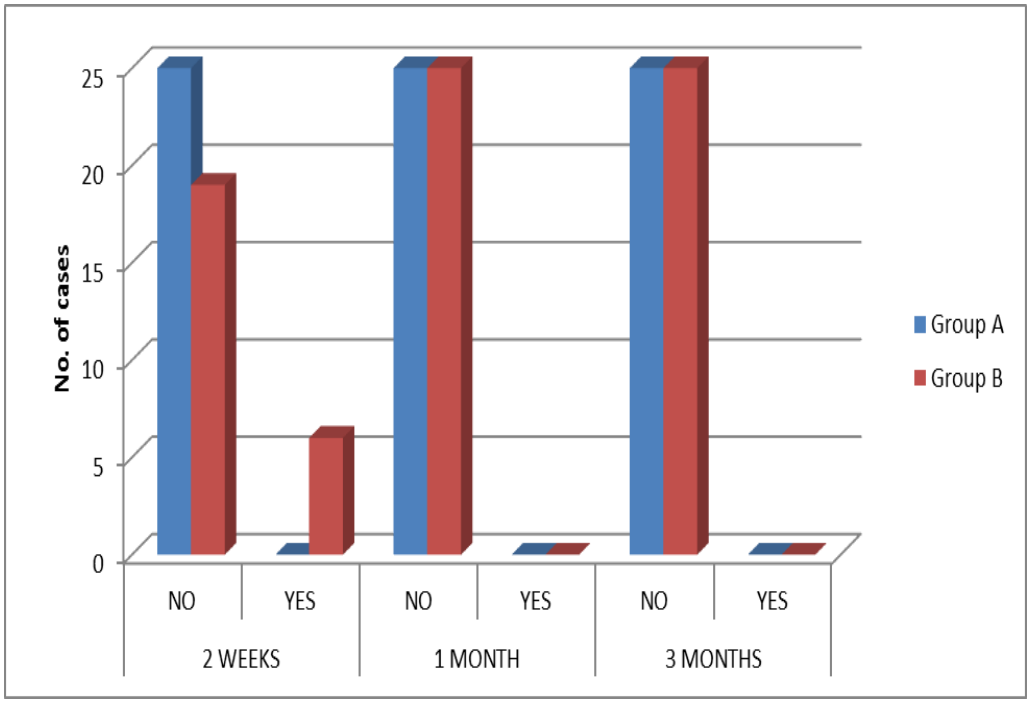

Figure 14. Distribution of the study groups according to surgical site infections at 2 weeks, 1 month and 3 months

The surgical site infection were present in 24% of the patients of Group B (IPOM) and none was seen in patients in Group A (IPOM plus) group at 2 weeks.

Table 17. Distribution of the study groups according to chronic pain – at 2 weeks, 1 month and 3 months

CHRONIC PAIN		NO. OF CASES IN GROUP–A (IPOM PLUS)	NO. OF CASES IN GROUP–B (IPOM)	Total
AT 2 WEEKS	NO	21	25	46
	YES	4	0	4
AT 1 MONTH	NO	22	25	47
	YES	3	0	3
AT 3 MONTHS	NO	22	25	47
	YES	3	0	3

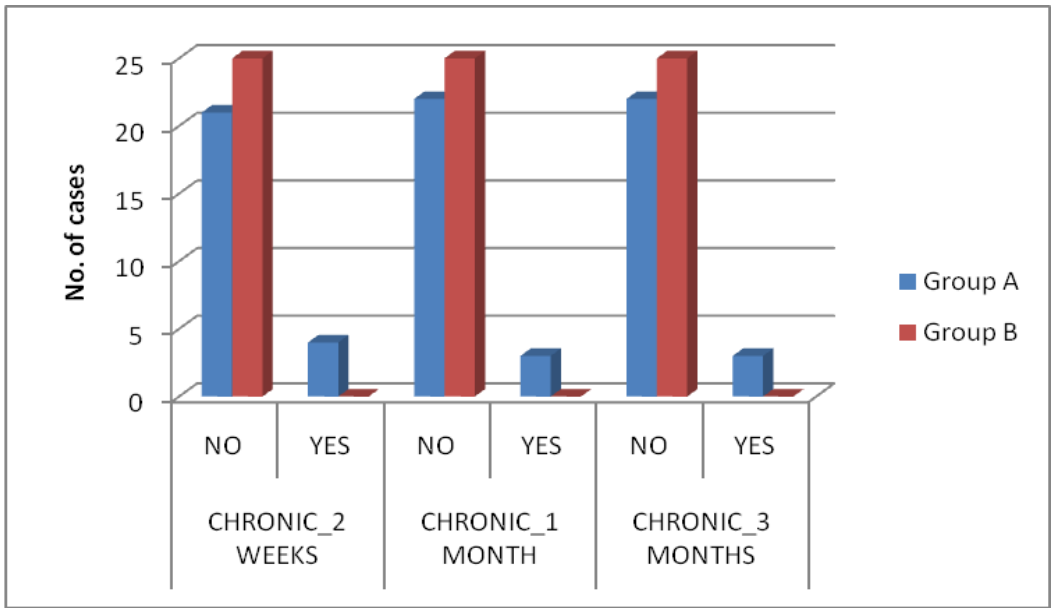

Figure 15. Distribution of the study groups according to chronic pain – at 2 weeks, 1 month and 3 months

4 (16%) of 25 patients in Group-A reported chronic pain but none in Group-B had chronic pain after 2 weeks of follow up. However after 1 month and 3 months of follow up, 12% and 12% of the patients respectively in IPOM plus group and none of the patients in IPOM group had chronic pain after 1 month and 3 months of follow up.

Table 18. Distribution of the study groups according to Adhesive intestinal obstruction – at 2 weeks, 1 month and 3 months

ADHESIVE INTESTINAL OBSTRUCTION		NO. OF CASES IN GROUP–A (IPOM PLUS)	NO. OF CASES IN GROUP–B (IPOM)	Total
AT 2 WEEKS	NO	25	25	50
	YES	0	0	0
AT 1 MONTH	NO	25	25	50
	YES	0	0	0
AT 3 MONTHS	NO	25	21	46
	YES	0	4	4

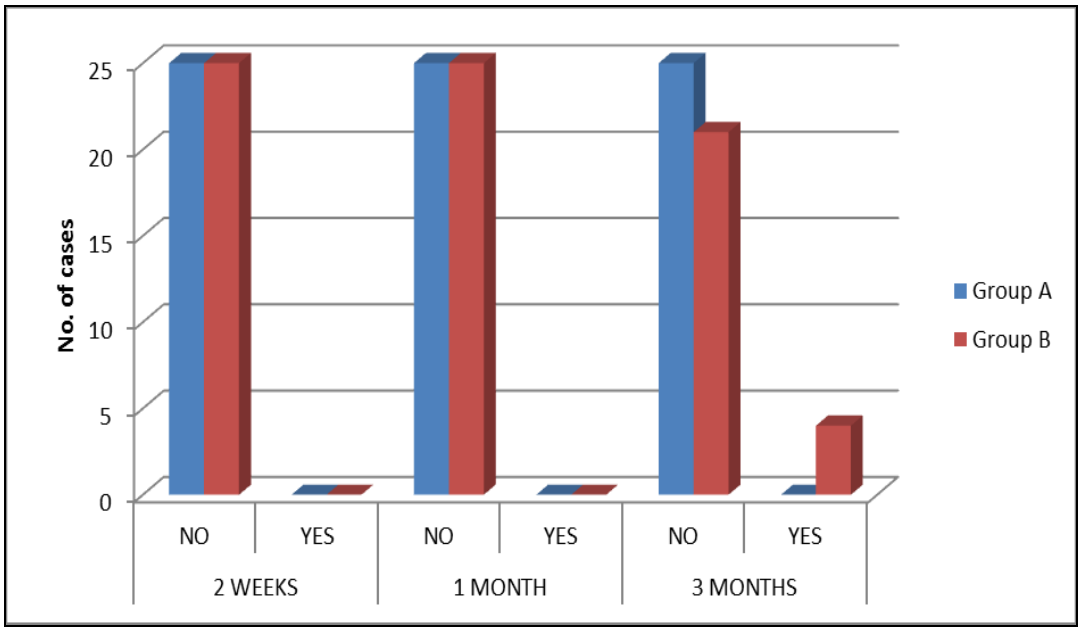

Figure 16. Distribution of the study groups according to Adhesive intestinal obstruction – at 2 weeks, 1 month and 3 months

No patients in Group A (IPOM - PLUS) and about 16% of the cases in Group B (IPOM) had adhesive intestinal obstruction after 3 months of follow up.

DISCUSSION

Although LVHR has gained acceptance since its introduction, several modifications have been proposed to improve outcomes. Despite the ‘‘standard’’ LVHR without defect closure confronts the surgical principles of ventral hernia repair, this technique is the most frequently performed. In this study, we aimed to evaluate whether closing the hernia defect during LVHR affects postoperative morbidity and recurrence rates. In our study we included two groups Group- A and Group- B. Group A included patients undergoing defect closure with mesh repair (IPOM-Plus) and Group-B included patients undergoing mesh repair without defect closure (IPOM).

In our study, mean age of patients was 49.40 years and 50.28 years in patients who underwent defect closure and non closure respectively. Similar results were found in study published by Luis A. Martin- del- Campo et al [63], mean age of patients was 53.4 years and 57.9 years in patients who underwent defect closure (IPOM-Plus) and non closure (IPOM) respectively.

In this clinical study, there were 12 males (48%) and 13 females (52%) in patients with defect closure (IPOM-Plus) while there were 14 males (56%) and 11 females (44%) in patients without defect closure (IPOM).In study published by Luis A. Martin-del-Campo et al[63], there were 80 males (36%) and 142 females (64%) in patients with defect closure while there were 213 males (38%) and 348 females (62%) in patients without defect closure. In the works of Gonzales et al (2014)[54], there were 26 males (38.2%) and 41 females (61.8%) in patients with defect closure while there were 21 males (38.4%) and 46 females (68.6%) in patients without defect closure. These studies had a higher proportion of female patients undergoing LVHR whereas our study had almost equal proportionate of both the gender.

In study done by us, the mean body mass index of patients in Group A was 30.5 kg/m2 and in Group B the mean BMI was 30.9 kg/m2. Similar results were observed by Zeichen et al (2013) [46], where the mean body mass index was 31.7 kg/m2 in patients with defect closure while

the mean body mass index was 30.2 kg/m2 in patients with non-closure of the defect . Also similar results were seen in study published by Wennergren et al (2015) [48], where the mean body mass index was 32.6 kg/m2 in patients with defect closure while the mean body mass index was 32.8 kg/m2 in patients with non- closure of the defect.

Although in our study, none of the patients were diabetic (0%) in patient Group - A while there were 4 diabetic patients (16%) in patient Group-B.,9 (18%) out of 50 patients were hypertensive, 1 (2%) out of 50 patients had coronary artery disease, 1 (2%) out of 50 patients had chronic kidney disease and 1 (2%) patient had history of malignancy (carcinoma urinary bladder).The published works of Luis A. Martin- del- Campo et al [63], had 40 diabetic patients (18%) in patient group with defect closure (IPOM-Plus) and 117 diabetic patients (20.8%) in patient group without defect closure (IPOM). Clapp et al (2012) [45] discovered 10 diabetic patients (27.8%) in patient group with defect closure (IPOM-Plus) and 14 diabetic patients (38.9%) in patient group without defect closure (IPOM).

In our study, 8 (32 %) patients out of 25 patients in Group-A and 5 (20%) out of 25 patients in Group-B had history of previous surgery. Gonzales et al (2014) [54] had 54 out of 67 patients (80.6%) in Group with defect closure (IPOM-Plus) with history of previous surgery and 60 out of 67 patients (89.5%) in Group without defect closure (IPOM) had history of previous surgery. Contrary to our results the history of previous surgery were comparatively more conspicuous in their study.

We observed a mean defect size was 3.26 cm in Group–A and mean defect size of 3.14 cm in Group-B. Similarly Raja et al (2018)[61], calculated the mean defect size of ventral hernia to be 3.8 cm in Group with defect closure (IPOM-Plus) and 3.9 cm in Group without defect closure (IPOM). Whereas in demonstrated works of Martin et al (2018)[63], the mean defect size was 5.0 cm in Group with defect closure and 5.5 cm in Group without defect closure. In study by Ayman Mhamoud Elwan et al (2019) [64], the mean defect size was 4.74 cm in Group with defect closure (IPOM-Plus) and 4.67 cm in Group without

defect closure (IPOM). The mean defect size was similar in both the groups in all three of these studies.

Our study showed small bowel alone was content of hernial sac in 7 out of 50 patients (28%) and large bowel alone was content of hernial sac in 1 out of 50 patients (2%). Omentum was the main content of hernial sac in this study amounting to 40 in 50 patients (80%) and small and large bowel were combined content of hernial sac in 2 out of 50 patients (4%) in this study. Similar results were found in study Gonzales et al (2014) [54], small bowel alone was the content of hernial sac in 16 out of 134 patients (11.9%) and large bowel was content in 4 out of 134 patients (2.98%).

The mean duration of surgery in study conducted by us was 112.8 minutes in Group with defect closure (IPOM-Plus) and mean duration of surgery was 102 minutes in Group without defect closure (IPOM).Similarly, the study by Luis A. Martin-del-Campo et al (2018)[63], showed the mean duration of surgery to be 109 minutes in Group with defect closure (IPOM-Plus) and the mean duration of surgery to be 104 minutes in Group without defect closure (IPOM). The study by Gonzales et al (2014) [54] had mean duration of surgery of 107 minutes in Group with defect closure (IPOM-Plus) and mean duration of surgery was 87 minutes in Group without defect closure (IPOM). The mean duration of surgery was longer in Group –A which amounts to extra time for defect closure as well.

The severity of pain as projected in our study in post-operative period was compared as per visual analogue scale. Most of the patients (32%) scored 3 out of 10 on visual analogue scale in Group A and most of patients (40%) scored 2 out of 10 as per visual analogue scale in Group B.

The mean duration of hospital stay in our study for patients included in Group A was 5.20 days and the mean duration of hospital stay was 4.80 days in Group B. Raja et al (2018) [61] stated the mean duration of hospital stay was 2.1 days in Group with defect closure (IPOM-Plus) and the mean duration of hospital stay was 2.25 days in Group without defect closure (IPOM). The published works of Gonzales et al (2014)[54]

had mean duration of hospital stay of 2.5 days in Group with defect closure (IPOM-Plus) and the mean duration of hospital stay of 3 days in Group without defect closure (IPOM). There was no significant change in the mean duration of hospital stay while comparing both the groups.

The formation of hematoma/seroma in this study was seen in none of the patients in Group A whereas in Group B at 2 weeks it was observed in 6 patient (24%), at 1 month it was observed in 3 patients (12%) and at 3 months it was observed in 1 patient (4%) patients out of 25 patients. However, Raja et al (2018) [61] found out that in Group- A (who underwent IPOM Plus), only 2 (5%) out of 40 patients developed seroma postoperatively, while in Group-B (those who underwent IPOM), 7 (17.5%) out of 40 patients developed seroma formation. P value was 0.1516. Again, in the acclaimed works of Martin et al (2018) [63], 1 (0.4%) out of 222 patients in Group- A (who underwent IPOM Plus) developed seroma postoperatively and 65 (11.5%) out of 561 patients in Group- B (who underwent IPOM) developed seroma postoperatively. Clapp et al (2012) [45] observed that in Group- A (who underwent IPOM Plus), only 2 (5.6%) out of 36 patients developed seroma postoperatively, while in Group-B (those who underwent IPOM), 10 (27.8%) out of 36 patients developed seroma formation. P value was 0.02. We observed that hematoma/seroma formation was more observed in patients undergoing mesh repair without defect closure.

The study conducted by us observed surgical site infection in none of the patients included in Group A whereas it was observed in 6(24%) out of 25 patients in Group B. p value was statistically significant for this observation (p=0.022). Though Martin et al (2018) [63], had only 1 (0.4%) out of 222 patients in Group- A (who underwent IPOM PLUS) developing surgical site infection but it was in 3 (0.5%) out of 561 patients in Group- B (who underwent IPOM) who developed surgical site infections postoperatively. P value was statistically insignificant (p = 0.902). However, as published by Wennergren et al (2015) [48] 20 (20.6%) out of 97 patients in Group- A (who underwent IPOM Plus)

developed surgical site infection and 24 (24.2%) out of 99 patients in Group- B (who underwent IPOM) developed surgical site infection. p value was statistically insignificant (p = 0.543). Hence forth we observed that the patients who are undergoing mesh repair without defect closure are more prone to surgical site infections.

Lastly, in this study, 4 (16%) of 25 patients in Group-A reported post operative pain but none in Group-B had same after 2 weeks of follow up. However after 1 month and 3 months of follow up, 12% and 12% of the patients respectively in IPOM plus group and none of the patients in IPOM group had chronic pain after 1 month and 3 months of follow up**.** Similar results were observed in study published by Ayman Mhamoud Elwan et al (2019) [64], chronic pain was observed in 4 (12.9%) out of 31 patients in Group with defect closure (IPOM-Plus) and chronic pain was observed in 2 (6.7%) out of 30 patients in Group without defect closure (IPOM).p value was statistically insignificant (p = 0.41). Post-operative chronic pain was more observed in patients in Group- A owing to the fact of closure of the defect.

Despite the advantages of laparoscopic ventral hernia repair, problems like hematoma/seroma, surgical site infections and adhesive intestinal obstruction still exist which require management to further improve its results. An additional step of closing the defect in patients of Group A before placing the mesh was performed. The rationale for closure of sac is that it re-establishes viable tissue which provides a lattice upon which mesh can be placed. It reduces subcutaneous dead tissue space and it provides tissue patches for mesh placement and promotes tissue ingrowth into entire surface of mesh improving overall outcome. In our study, we have been able to establish the distinct advantage of closure of defect in laparoscopic repair of ventral hernia. Although both the methods of hernia repair are similar and almost comparative in many of the parameters and not much difference is seen in many of the post-operative complications but we were able to affirm the superiority of IPOM-plus over IPOM. Our study's significance was in gaining knowledge about the advantage of closure of defect. This study was also not without its limitation. The study was applied to a single tertiary

centre and hence the limited number of patients therefore multicentre study performed by multiple observers with larger populations of patients are necessary to confirm the present findings and longer duration of follow up

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SUMMARY AND CONCLUSION

1. This prospective study of 1 year for hernia repair by IPOM-Plus was conducted in General Surgery Department of Dayanand Medical College & Hospital, Ludhiana during January 2018 to December 2018 and outcome was compared with the data collected for hernia repairs done by using IPOM technique during January 2017 to December 2017. Total 50 patients included in this study, out of which 25 patients underwent IPOM-Plus (Group- A) and 25 patients underwent IPOM (Group- B).
2. Patients were assessed for short term complications like surgical site infection, wound dehiscence, seroma/ haematoma, bowel complications, need for re-surgery, duration of hospital stay & post – operative pain; and long term complications like recurrence at 3 months, seroma/ haematoma, mesh infection, chronic pain, adhesive intestinal obstruction, enterocutaneous fistulae and need for re- surgery. Follow ups after discharge were done at intervals of 2 weeks, 1 month and 3 months.
3. None of the patients had any intraoperative complications. Mean duration of surgery in IPOM plus group was 112.8 minutes and 102 minutes in IPOM group which was statistically not significant.
4. Post- operative hematoma/ seroma formation at 2 weeks, 1 month and 3 months follow up concluded with observation of 24%, 12% and 4% patients respectively in Group B as compared to none of the patients in Group A. The surgical site infection was present in 24% of the patients of Group B (IPOM) and none was seen in patients in Group A (IPOM plus) group at 2 weeks. 4 (16%) out of 25 patients in Group- A had post operative pain but none of patients in Group –B reported any complaints of pain on follow up at 2 weeks . however after 1 month and 3 months of follow up 3(12 %) out of 25 patients in IPOM-Plus group and none in Group- B (IPOM) had pain. No patients in Group A (IPOM - Plus) and about 16% of the cases in Group B (IPOM) had adhesive intestinal obstruction after 3 months of follow up.

5. This study was also not without its limitation as it was applied to a single tertiary centre and hence the limited number of patients, therefore multicentre study performed by multiple observers with larger populations of patients are necessary to confirm the present findings.
6. Thus we conclude that laparoscopic repair ventral hernias with closure of defect followed by mesh reinforcement is an acceptable technique and superior to non-closure of defect in terms of post-operative morbidity and body image satisfaction. It also provides an overall better quality of life to the patients. It is thus recommended to close the sac defect in laparoscopic repair of ventral hernia before mesh reinforcement, given the surgeon is experienced in this field.

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Sr. No.	NAME	GROUP	AGE	AGE GROUP	SEX	MRD NO	DATE OF ADMISSION	DATE OF SURGERY	DDATE OF DISCHARGE	CHIEF COMPLAINTS	MALIGNANCY	CHRONIC STEROID USE	DIABETES	COPD	CARDIOVASCULAR	OTHERS	SMOKING	ALCOHOL ABUSE	NICOTINE/ OPOID ABUSE	HR	BP	RR	TEMP	Built	Nutrition	GCS	Pallor	Edema	Icterus	Cyanosis	Lymphadenopathy	Clubbing	JVP	HEMOGLOBIN	TLC
1	AS	1	38	1	MALE	517386	25/7/2018	25/7/2018	27/7/2018	2 MONTHS	NO	NO	NO	NO	NO	NO	NO	NO	NO	78	110\70	14	98.4	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	11.8	6.4
2	PG	1	36	1	FEMALE	730778	17/5/2018	18/5/2018	20/5/2018	2 YEARS	NO	NO	NO	NO	NO	NO	NO	NO	NO	70	114\70	12	98.6	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	9.2	7.2
3	BD	1	67	3	FEMALE	727359	13/5/2018	14/5/2018	17/5/2018	10 YEARS	NO	NO	NO	NO	NO	HYPERTENSION	NO	NO	NO	82	138\70	15	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	11.3	10
4	MS	1	31	1	MALE	429068	15/10/2018	16/10/2018	19/10/2018	10 MONTH	NO	NO	NO	NO	NO	NO	NO	NO	NO	79	120\80	14	97	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	10.4	8.8
5	JPS	1	38	1	MALE	595877	5/10/2018	6/10/2018	9/10/2018	1 MONTH	NO	NO	NO	NO	NO	LAPAROSCOPIC VARICOCELE REPAIR	NO	NO	NO	68	130\80	18	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	14.7	6.8
6	AS	1	55	2	MALE	412907	26/1/2018	27/1/2018	31/1/2018	2 YEARS	NO	NO	NO	NO	YES	HYPERTENSION	NO	NO	NO	60	140\80	15	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	9.4	10
7	MK	1	60	2	FEMALE	367000	12/10/2018	13/10/2018	16/10/2018	4 MONTH	NO	NO	NO	NO	NO	HYPERTENSION	NO	NO	NO	70	120\70	20	97	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	10.2	9
8	IK	1	41	2	FEMALE	767159	14/4/2018	15/4/2018	18/4/2018	1 YEAR	NO	NO	NO	NO	NO	NO	NO	NO	NO	79	120\90	18	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	13	8
9	ZAQ	1	50	2	MALE	750604	19/6/2018	20/6/2018	22/6/2018	1.5 YEARS	NO	NO	NO	NO	NO	APPENDICECTOMY	NO	NO	NO	73	140\90	18	98.6	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	12.4	7.9
10	KS	1	37	1	MALE	457714	18/4/2018	18/4/2018	19/4/2018	2 YEARS	NO	NO	NO	NO	NO	NO	NO	NO	NO	88	130\80	18	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	14.1	9.6
11	SS	1	68	3	FEMALE	620010	20/11/2018	21/11/2018	30/11/2018	1MONTH	NO	NO	NO	NO	NO	NO	NO	NO	NO	76	120\80	18	97	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	9.8	10.4
12	JS	1	45	2	MALE	569757	3/9/2018	4/9/2018	7/9/2018	5 YEARS	NO	NO	NO	NO	NO	NO	NO	NO	NO	80	148\70	16	98.6	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	13.9	8
13	JS	1	36	1	MALE	762212	17/7/2018	17/7/2018	18/7/2018	2 MONTHS	NO	NO	NO	NO	NO	NO	NO	NO	NO	84	110\70	20	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	12.9	8.9
14	UR	1	63	3	FEMALE	737712	11/6/2018	12/6/2018	17/6/2018	4 MONTHS	NO	NO	NO	NO	NO	NO	NO	NO	NO	87	138\90	18	97.8	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	8.8	8
15	PK	1	51	2	FEMALE	481216	27/5/2018	27/5/2018	29/5/2018	2 MONTHS	NO	NO	NO	NO	NO	HYSTERECTOMY	NO	NO	NO	102	140\90	15	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	11.1	9.3
16	U	1	62	3	FEMALE	738717	4/8/2018	4/8/2018	6/8/2018	1 YEAR	NO	NO	NO	NO	NO	HYPERTENSION	NO	NO	NO	98	138\76	16	97	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	8.9	10.1
17	AC	1	60	2	FEMALE	635718	14/12/2018	15/12/2018	19/12/2018	1 MONTH	NO	NO	NO	NO	NO	NO	NO	NO	NO	108	110\70	14	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	13.8	8.7
18	B	1	50	2	FEMALE	232677	29/3/2018	30/3/2018	4/4/18	2 YEARS	NO	NO	NO	NO	NO	HYSTERECTOMY	NO	NO	NO	78	126\70	16	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	12.1	8
19	JD	1	65	3	FEMALE	600597	1/2/2018	2/2/2018	8/2/2018	1 YEAR	NO	NO	NO	NO	NO	NO	NO	NO	NO	98	138\78	18	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	14.3	8.3
20	GK	1	68	3	FEMALE	749371	17/10/18	18/10/2018	22/10/2018	1 YEAR	NO	NO	NO	NO	NO	HYPERTENSION	NO	NO	NO	92	110\70	12	98.8	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	14.1	8.8
21	PS	1	41	2	MALE	720057	1/11/2018	2/11/2018	7/11/2018	8 MONTHS	NO	NO	NO	NO	NO	LAPAROTOMY	NO	NO	NO	102	120\70	18	98.6	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	10.4	8.8
22	MC	1	35	1	MALE	664939	11/2/2018	12/2/2018	16/2/2018	5 YEARS	NO	NO	NO	NO	NO	APPENDICECTOMY	NO	NO	NO	104	110\70	14	97.8	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	12.4	8.9
23	MS	1	28	1	MALE	333860	1/8/2018	2/8/2018	5/8/2018	8 MONTHS	NO	NO	NO	NO	NO	NO	NO	NO	NO	70	130\90	14	98.6	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	14.1	6.2
24	NK	1	53	2	MALE	323816	13/8/2018	14/8/2018	16/8/2018	1 MONTH	NO	NO	NO	NO	NO	NO	NO	NO	NO	72	130\80	18	98.2	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	13.9	7
25	AJ	1	57	2	FEMALE	660883	28/1/2018	29/1/2018	4/2/2018	1 YEAR	NO	NO	NO	NO	NO	NO	NO	NO	NO	88	120\80	18	98.2	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	11.2	3.9
1	SS	2	77	3	MALE	712310	19/4/2017	20/4/2017	22/4/2017	5 YEARS	NO	NO	NO	NO	NO	NO	NO	NO	NO	70	118\70	16	98.4	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	14.1	8.2
2	MS	2	34	1	MALE	440824	21/2/2017	22/2/2017	24/2/2017	1 YEAR	NO	NO	NO	NO	NO	NO	NO	NO	NO	69	114\78	18	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	13.2	4.8
3	AS	2	54	2	MALE	69723	22/6/2017	23/6/2017	26/6/2017	1 MONTH	NO	NO	NO	CAD	NO	NO	NO	NO	NO	79	128\72	14	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	16.1	8.1
4	SK	2	40	1	FEMALE	273029	25/5/2017	26/5/2017	29/5/2017	6 MONTHS	NO	NO	NO	NO	NO	NO	NO	NO	NO	78	110\70	18	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	14	4.9
5	SB	2	69	3	MALE	693078	21/3/2017	22/3/2017	24/3/2017	2 YEARS	NO	NO	NO	NO	NO	NO	NO	NO	NO	78	118\70	20	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	12.5	6.4
6	PK	2	37	1	FEMALE	218744	10/3/2017	10/3/2017	11/3/2017	15 DAYS	NO	NO	NO	NO	NO	NO	NO	NO	NO	72	110\60	18	97	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	13.9	6.6
7	GC	2	34	1	MALE	141506	9/3/2017	10/3/2017	12/3/2017	1 1/2 YRS	NO	NO	NO	NO	NO	NO	NO	NO	NO	90	110\60	22	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	13.7	6.6
8	DD	2	31	1	FEMALE	241729	11/4/2017	12/4/2017	15/4/2017	15 DAYS	NO	NO	NO	NO	NO	NO	NO	NO	NO	74	110\60	18	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	12	9.6
9	SCJ	2	40	1	MALE	22915	9/10/2017	10/10/2017	16/10/2017	1 MONTH	NO	NO	NO	NO	NO	LAPAROTOMY	NO	NO	NO	78	118\60	18	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	14.5	12.6
10	NP	2	40	1	FEMALE	388278	15/11/2017	16/11/2017	18/11/2017	2 YEARS	NO	NO	NO	NO	NO	CESAREAN	NO	NO	NO	88	110\80	20	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	12.5	8.7
11	SS	2	52	2	MALE	299827	21/7/2017	21/7/2017	23/7/2017	4 YEARS	NO	NO	YES	NO	NO	HYPERTENSION	NO	NO	NO	100	128\80	18	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	12.1	4.6
12	MS	2	58	2	MALE	205709	26/4/2017	27/4/2017	30/4/2017	3 MONTH	NO	NO	YES	NO	NO	LAPAROTOMY HYPERTENSION	NO	NO	NO	78	140\70	18	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	12.9	10
13	SD	2	59	2	FEMALE	360874	3/10/2017	4/10/2017	7/10/2017	2 MONTH	NO	NO	NO	NO	NO	NAD	NO	NO	NO	74	120\80	18	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	15.1	6.4
14	MK	2	70	3	FEMALE	375141	25/10/2017	26/10/2017	29/10/2017	10 YEARS	NO	NO	NO	NO	NO	LAPAROTOMY	NO	NO	NO	102	120\90	14	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	12.9	7.5
15	A	2	62	3	FEMALE	381142	3/11/2017	3/11/2017	6/11/2017	2 MONTHS	NO	NO	NO	NO	NO	HYSTERECTOMY	NO	NO	NO	78	118\70	14	97	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	8.6	9
16	BSM	2	53	2	MALE	386551	12/11/2017	13/11/2017	16/11/2017	3 YEARS	NO	NO	NO	NO	NO	VENTRAL HERNIA	NO	NO	NO	70	108\68	18	97	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	12.5	8.9
17	SS	2	52	2	FEMALE	391965	22/11/2017	23/11/2017	27/11/2017	10 YEARS	NO	NO	YES	NO	NO	HYPERTENSION	NO	NO	NO	70	110\70	14	97	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	7.8	7.2
18	PRS	2	73	3	MALE	397213	6/12/2017	7/12/2017	14/12/2017	3 YEARS	CA BLADDER	NO	NO	NO	NO	RADICAL CYSTECTOMY	NO	NO	NO	70	118\70	18	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	13.4	6.4
19	AG	2	52	2	MALE	403086	12/12/2017	12/12/2017	15/12/2017	4 MONTHS	NO	NO	NO	NO	NO	NAD	NO	NO	NO	70	118\72	18	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	14.2	8.3
20	IB	2	48	2	FEMALE	410985	28/12/2017	29/12/2017	2/1/2018	2 MONTHS	NO	NO	NO	NO	NO	HYPERTENSION	NO	NO	NO	73	110\70	14	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	9.3	11.4
21	RS	2	48	2	FEMALE	629219	30/11/2017	30/11/2017	3/2/2017	3 MONTHS	NO	NO	NO	NO	NO	NO	NO	NO	NO	79	120\70	18	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	12.7	8.1
22	AS	2	34	1	MALE	176879	28/2/2017	1/3/2017	4/3/2017	3 MONTHS	NO	NO	NO	NO	NO	NO	NO	NO	NO	70	110\70	18	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	13.2	8.4
23	GS	2	43	2	MALE	333251	11/9/2017	12/9/2017	14/9/2017	2 YEARS	NO	NO	NO	NO	NO	NO	NO	NO	NO	70	120\80	18	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	12.1	8.2
24	KD	2	63	3	FEMALE	667266	7/2/2017	8/2/2017	12/2/2017	1 1/2 YEARS	NO	NO	YES	NO	NO	CRF	NO	NO	NO	73	120\80	18	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	9.2	11.2
25	MKJ	2	34	1	MALE	326072	29/4/2017	29/4/2018	1/5/2017	1 WEEK	NO	NO	NO	NO	NO	NO	NO	NO	NO	68	128\70	12	98	MOD	ADQ	15	NO	NO	NO	NO	NO	NO	NO	9.8	4.1

Sr. No.	NAME	GROUP	AGE	PLATELETS	PTI	INR	B.UREA	S.CREATININE	B.SUGAR	Na	K	CL	T.BILIRUBIN	D.BILIRUBIN	SGOT	SGPT	T.PROTEINS	ALBUMIN	HbsAg/ ANTI-HCV/ ANTI-HIV	CHEST XRAY	USG ABDOMEN	OTHERS	DATE OF SURGERY	NAME OF PROCEDURE	TYPE OF ANAESTHESIA GIVEN	DURATION OF SURGERY	DEFECT SIZE	DEFECT SIZE TOTAL	CONTENTS	MESH REPAIR	NEED OF OPEN REPAIR
1	AS	1	38	122	11	1.04	17	0.45	100	138	4	100	0.43	0.4	18	21	7.2	3.9	NON REACTIVE	NORMAL	SMALL UMBLICAL HERNIA, DEFECT 1X1CM, GUT LOOPS WITH OMENTUM	NAD	25/7/2018	IPOM PLUS	GA	1.3	1X1 CM	1	COLON , OMENTUM	PARIETEX COMPOSITE	NO
2	PG	1	36	140	14.3	1.14	23	0.63	110	130	3.8	99	0.8	0.68	31	30	6.8	3.7	NON REACTIVE	NORMAL	SMALL UMBLICAL HERNIA ,DEFECT 1X 2 CM, OMENTUM	NAD	18/5/2018	IPOM PLUS	GA	1.3	1.5 X 2 CM	3	OMENTUM	PARIETEX COMPOSITE	NO
3	BD	1	67	198	14.1	1.13	48	0.8	130	140	4	100	0.76	0.7	14	15	6.3	3.3	NON REACTIVE	NORMAL	LARGE SUPRAUMBLICAL HERNIA , DEFECT 6X 4 CM, GUT LOOPS	NAD	14/5/2018	IPOM PLUS	GA	1.45	6 X 3 CM	18	COLON , SMALL BOWEL	PARIETEX COMPOSITE	NO
4	MS	1	31	298	13	1.08	42	0.9	103	135	3.9	98	0.52	0.48	19	21	6.9	3.9	NON REACTIVE	NORMAL	HEPATOMEGALY,FATTY LIVER GRADE-II, OMENTUM	NAD	16/10/2018	IPOM PLUS	GA	1.15	2X2 CM	4	OMENTUM	PARIETEX COMPOSITE	NO
5	JPS	1	38	238	10.1	1	42	0.8	112	131	4	101	0.41	0.37	40	42	7.4	4.1	NON REACTIVE	NORMAL	SMALL SUPRAUMBLICAL HERNIA FATTY LIVER GRADE -I, DEFECT 1X1 CM, OMENTUM	NAD	6/10/2018	IPOM PLUS	GA	1.15	1X1 CM	1	OMENTUM	PARIETEX COMPOSITE	NO
6	AS	1	55	198	14.9	1.4	28	0.7	142	138	4	100	0.88	0.7	41	49	6.9	3.8	NON REACTIVE	NORMAL	CHRONIC CALCULOUS CHOLECYSTITIS UMBLICAL HERNIA FATTY LIVER GRADE-I	NAD	27/1/2018	IPOM PLUS + LAP CHOLECYSTECTOMY	GA	2	2 X2 CM	4	OMENTUM	PARIETEX COMPOSITE	NO
7	MK	1	60	458	14.7	1.3	49	0.9	129	130	3.3	100	0.52	0.4	38	43	7.1	4.1	NON REACTIVE	NORMAL	MULTIPLE DEFECTS - SUPRAUMBLICAL AND UMBLICAL HERNIA, OMENTUM	NAD	131/1/2018	IPOM PLUS	GA	1.3	5X4 + 2.5X2.5 CM	26.25	OMENTUM	PARIETEX COMPOSITE	NO
8	IK	1	41	428	15	1.48	35	0.65	98	140	4	101	0.49	0.39	28	19	6.8	3.8	NON REACTIVE	NORMAL	NAD	CECT - UMBLICAL HERNIA , CONTENT OMENTUM	15/4/2018	IPOM PLUS	GA	1.3	4X3 + 2X2 CM	16	OMENTUM	PARIETEX COMPOSITE	NO
9	ZAQ	1	50	346	14.8	1.38	48	0.08	138	140	5	102	1.02	0.82	46	47	6.8	3.9	NON REACTIVE	NORMAL	SUPRAUMBLICAL HERNIA, OMENTUM	NAD	20/6/2018	IPOM PLUS	GA	1.3	1.5 X 1.5 CM	2.25	OMENTUM	PARIETEX COMPOSITE	NO
10	KS	1	37	238	11.8	1.1	40	0.8	118	138	4	101	0.8	0.68	40	42	6	4.2	NON REACTIVE	NORMAL	CHRONIC CALCULOUS CHOLECYSTITS WITH UMBLICAL HERNIA	NAD	17/4/2018	IPOM PLUS	GA	2	1.5X1.5 CM	2.25	OMENTUM	PARIETEX COMPOSITE	NO
11	SS	1	68	308	12.8	1.17	48	1.02	88	140	4.1	104	0.86	0.58	40	43	7	4.1	NON REACTIVE	NORMAL	SUPRAUMBLICAL HERNIA ,DEFECT 3 CM, OMENTUM	NAD	21/11/2018	IPOM PLUS	GA	2	3 X 3 CM	9	OMENTUM	PARIETEX COMPOSITE	NO
12	JS	1	45	198	13.1	1.26	48	0.9	140	138	4.8	101	0.8	0.58	18	21	6.3	3.9	NON REACTIVE	NORMAL	UMBLICAL HERNIA	NAD	4/9/2018	IPOM PLUS	GA	1	3 X 3 CM	9	OMENTUM	PARIETEX COMPOSITE	NO
13	JS	1	36	169	13.1	1.4	38	0.19	90	140	4	101	0.71	0.3	19	21	6.9	3.8	NON REACTIVE	NORMAL	SMALL UMBLICAL HERNIA	NAD	17/7/2018	IPOM PLUS	GA	1.3	2 X 2 CM	4	OMENTUM	PARIETEX COMPOSITE	NO
14	UR	1	63	380	15.1	1.4	40	0.5	83	134	4	100	0.72	0.38	49	41	6.7	3.9	NON REACTIVE	NORMAL	UMBLICAL HERNIA , 3 CM DEFECT , OMENTUM	NAD	12/6/2018	IPOM PLUS	GA	1.3	3 X3 CM	9	OMENTUM	PARIETEX COMPOSITE	NO
15	PK	1	51	208	11.8	1.1	28	0.8	103	138	3.8	101	0.83	0.59	28	29	8.3	4.3	NON REACTIVE	NORMAL	NAD	NAD	27/5/2018	IPOM PLUS	GA	2	3 X 3 CM	9	OMENTUM	PARIETEX COMPOSITE	NO
16	U	1	62	264	11.3	1	80	1.02	130	146	4	107	0.88	0.58	19	21	8	4.2	NON REACTIVE	NORMAL	CHRONIC CHOLECYSTITIS WITH CHOLELITHIASIS WITH UMBLICAL HERNIA	NAD	4/8/2018	IPOM PLUS + LAP CHOLECYSTECTOMY	GA	2.3	3.5 X 2.5 CM	8.75	OMENTUM	PARIETEX COMPOSITE	NO
17	AC	1	60	198	13.1	1.32	40	0.7	101	138	3.9	103	0.65	0.48	20	13	6	3.5	NON REACTIVE	NORMAL	NAD	NAD	15/12/2018	IPOM PLUS	GA	1	4 X 4 CM	16	OMENTUM	PARIETEX COMPOSITE	NO
18	B	1	50	198	13.8	1.08	39	0.3	130	140	4	101	0.75	0.48	18	17	6.6	3.9	NON REACTIVE	NORMAL	NAD	NAD	30/3/18	IPOM PLUS	GA	2	7 X 7 CM	49	SMALL BOWEL , OMENTUM	PARIETEX COMPOSITE	NO
19	JD	1	65	488	14.1	1.32	58	0.9	132	136	3.8	98	1	0.52	39	19	7.1	4.1	NON REACTIVE	NORMAL	ACUTE CALCULOUS CHOLECYSTITIS WITH SUPRAUMBLICAL DEFECT	NAD	2/2/2018	IPOM PLUS + LAP CHOLECYSTECTOMY	GA	2.45	3 X 4 CM	12	OMENTUM	PARIETEX COMPOSITE	NO
20	GK	1	68	403	10.1	1	42	0.68	130	138	4	109	0.92	0.48	18	14	8	4	NON REACTIVE	NORMAL	NAD	NAD	18/10/18	IPOM PLUS	GA	2	7 X 5 CM	35	SMALL BOWEL , OMENTUM	PARIETEX COMPOSITE	NO
21	PS	1	41	388	12.7	1.16	51	1.29	158	144	4.4	107	0.29	0.21	65	48	6.5	3.8	NON REACTIVE	NORMAL	NAD	CECT ABDOMEN - INCISIONAL HERNIA, CONTENT - OMENTUM	2/11/2018	IPOM PLUS	GA	2	5 X 5 CM	25	SMALL BOWEL , OMENTUM	PARIETEX COMPOSITE	NO
22	MC	1	35	503	11.1	1	43	0.9	130	138	3.8	108	0.58	0.29	34	42	8	4	NON REACTIVE	NORMAL	PARAUMBLICAL SWELLING	NAD	12/2/2018	IPOM PLUS	GA	2	5 X 5 CM	25	OMENTUM	PARIETEX COMPOSITE	NO
23	MS	1	28	428	11.8	1.12	43	0.4	81	130	4.1	100	0.43	0.28	18	21	7.6	4.1	NON REACTIVE	NORMAL	PARAUMBLICAL SWELLING 1.5 CM DEFECT , OMENTUM	NAD	2/8/2018	IPOM PLUS	GA	1.3	1.5 X 1.5	2.25	OMENTUM	PARIETEX COMPOSITE	NO
24	NK	1	53	383	13.2	1.34	37	0.7	138	136	3.9	104	0.7	0.4	19	29	7.1	4	NON REACTIVE	NORMAL	UMBLICAL HERNIA DEFECT 2 X2 CM OMENTUM	NAD	14/8/2018	IPOM PLUS	GA	1	4 X 4 CM	16	OMENTUM	PARIETEX COMPOSITE	NO
25	AJ	1	57	296	15.6	1.5	49	0.72	103	140	4	100	0.72	0.48	11	19	7.1	4.1	NON REACTIVE	NORMAL	HEPATOMEGALY GRADE -II SMALL UMBLICAL HERNIA DEFECT 2.1 CM	NAD	29/1/2018	IPOM PLUS	GA	2	2 X 2 CM	4	OMENTUM	PARIETEX COMPOSITE	NO
1	SS	2	77	218	13.9	1.32	49	0.7	113	130	4	99	0.98	0.88	19	28	6.7	3.7	NON REACTIVE	NORMAL	UMBLICAL HERNIA	NAD	20/4/2017	IPOM	GA	1.3	2 X 2 CM	4	OMENTUM	PARIETEX COMPOSITE	NO
2	MS	2	34	298	13.1	1.3	70	0.29	103	138	4	102	0.6	0.32	32	36	6.1	3.2	NON REACTIVE	NORMAL	UMBLICAL HERNIA	NAD	20/2/2017	IPOM	GA	1.45	2 X 2 CM	4	OMENTUM	PARIETEX COMPOSITE	NO
3	AS	2	54	402	14.7	1.5	40	0.8	114	140	3	98	0.8	0.7	41	43	6.8	3.7	NON REACTIVE	NORMAL	UMBLICAL HERNIA	NAD	23/6/2017	IPOM	GA	1.15	3 X 3 CM	9	OMENTUM	PARIETEX COMPOSITE	NO
4	SK	2	40	256	13.6	1.2	62	1.02	98	140	3.8	101	1.1	0.9	12	16	6	3.2	NON REACTIVE	NORMAL	PARAUMBLICAL HERNIA	NAD	26/6/2017	IPOM	GA	2	2 X 2 CM	4	OMENTUM	PARIETEX COMPOSITE	NO
5	SB	2	69	110	11.8	1.08	26	0.79	114	139	4.3	106	0.48	0.28	24	16	6.9	4.08	NON REACTIVE	NORMAL	SUPRAUMBLICAL HERNIA	NAD	22/3/2017	IPOM	GA	2	3 X 3 CM	9	OMENTUM	PARIETEX COMPOSITE	NO
6	PK	2	37	193	11.2	1.06	36	0.6	138	138	3.9	105	0.3	0.1	12	11	7.1	3.9	NON REACTIVE	NORMAL	SUPRAUMBLICAL HERNIA	NAD	10/3/2017	IPOM	GA	2	3 X 3 CM	9	OMENTUM	PARIETEX COMPOSITE	NO
7	GC	2	34	193	12.8	1.2	36	0.6	108	138	3.9	105	0.39	0.19	12	11	7.2	4	NON REACTIVE	NORMAL	PARAUMBLICAL HERNIA WITH RIGHT INGUINAL HERNIA	NAD	10/3/2017	IPOM + RIGHT INGUINAL HERNIA REPAIR	GA	2.3	1.5 X 2 CM	3	OMENTUM	PARIETEX COMPOSITE	NO
8	DD	2	31	198	13.1	1.4	28	0.8	110	130	3.5	101	0.8	0.7	13	19	7	4.9	NON REACTIVE	NORMAL	CHRONIC CALCULOUS CHOLECYTITIS WITH UMBLICAL HERNIA	NAD	12/4/2017	IPOM + LAP CHOLECYSTECTOMY	GA	2.3	3 X 3 CM	9	OMENTUM	PARIETEX COMPOSITE	NO
9	SCJ	2	40	731	13.6	1.24	29	1.03	130	133	5.3	102	0.24	0.06	20	8	7.9	3.05	NON REACTIVE	NORMAL	UMBLICAL HERNIA	2D ECHO - NORMAL	10/10/2017	IPOM	GA	2	2.4 X 2.4 CM	5.76	OMENTUM	PARIETEX COMPOSITE	NO
10	NP	2	40	448	14.3	1.13	39	0.8	104	138	4	101	0.81	0.69	11	12	7.4	4	NON REACTIVE	NORMAL	NAD	NAD	16/11/2017	IPOM	GA	2	5 X 6 CM	30	OMENTUM	PARIETEX COMPOSITE	NO
11	SS	2	52	180	13.1	1.02	30	0.17	100	130	4	99	0.42	0.28	38	28	7.3	4	NON REACTIVE	NORMAL	UMBLICAL HERNIA,2X2 CM	NAD	21/11/2017	IPOM	GA	2	2 X 2 CM	4	OMENTUM	PARIETEX COMPOSITE	NO
12	MS	2	58	206	16.8	1.7	18	1.03	177	136	4.6	101	0.47	0.11	22	19	6.02	3.8	NON REACTIVE	NORMAL	NAD	2D ECHO- NORMAL	27/11/2017	IPOM	GA	2	3 X 2 CM, 2 X 2 CM	10	OMENTUM	PARIETEX COMPOSITE	NO
13	SD	2	59	129	11.4	1.05	23	0.94	124	143	4.7	103	0.41	0.22	27	39	6.8	3.9	NON REACTIVE	NORMAL	PARAUMBLICAL HERNIA, GUT LOOPS , MESENTRY	PFT- MILD RESTRICTION	4/10/2017	IPOM	GA	2	2 X 2 CM	4	SMALL BOWEL , OMENTUM	PARIETEX COMPOSITE	NO
14	MK	2	70	248	11.2	1.03	22	0.63	140	141	4.1	102	0.21	0.09	25	26	6.8	3.9	NON REACTIVE	NORMAL	NAD	CECT ABDOMEN - MULTIPLE DEFECTS, CONTENT OMENTUM	26/10/2017	IPOM	GA	2	2 X 2 CM	4	OMENTUM	PARIETEX COMPOSITE	NO
15	A	2	62	120	10	1	18	0.98	103	136	4	103	0.45	0.18	21.9	21.2	8.04	4.5	NON REACTIVE	NORMAL	INFRAUMBLICAL INCISIONAL HERNIA	NAD	3/11/2017	IPOM	GA	2	2 X 3 CM	6	SMALL BOWEL , OMENTUM	PARIETEX COMPOSITE	NO
16	BSM	2	53	166	10.2	0.92	25	1.06	103	139	4.6	102	0.56	0.08	25	10	7.8	4.22	NON REACTIVE	NORMAL	VENTRAL HERNIA	NAD	13/11/2017	IPOM	GA	2	4 X 4 CM	16	OMENTUM	PARIETEX COMPOSITE	NO
17	SS	2	52	233	15.1	1.4	30	1.07	140	140	4.9	104	0.58	0.2	28	28	6.6	4.2	NON REACTIVE	NORMAL	SUPRAUMBLICAL INCISIONAL HERNIA	NAD	23/11/2017	IPOM	GA	2.3	1.8 X 2.4 CM	4.32	SMALL BOWEL , OMENTUM	PARIETEX COMPOSITE	NO
18	PRS	2	73	280	11.6	1.02	28	1.18	146	138	4.2	106	0.32	0.16	21	20	6.6	4	NON REACTIVE	NORMAL	NAD	NAD	7/12/2017	IPOM	GA	1.3	8 X 6 CM	48	SMALL BOWEL , OMENTUM	PARIETEX COMPOSITE	NO
19	AG	2	52	298	10.1	1.02	29	0.49	158	136	3.9	105	0.9	0.32	41	40	7	3.8	NON REACTIVE	NORMAL	NAD	NAD	12/12/2017	IPOM	GA	1	3 X 2 CM, 2 X 2 CM	10	OMENTUM	PARIETEX COMPOSITE	NO
20	IB	2	48	241	14.5	1.4	52	1	171	136	3.7	105	0.38	0.19	40	41	6.4	3.2	NON REACTIVE	NORMAL	PARAUMBLICAL HERNIA	NCCT ABDOMEN UMBLICAL HERNIA, CONTENT SMALL BOWEL, OMENTUM	29/12/2017	IPOM	GA	2	4 X 3 CM 4 X 4 CM	28	OMENTUM	PARIETEX COMPOSITE	NO
21	RS	2	48	301	11.2	1.1	38	0.8	140	130	4	101	0.58	0.28	13	15	7	4	NON REACTIVE	NORMAL	SUPRAUMBLICAL HERNIA	NAD	30/11/2017	IPOM	GA	1	4 X 3 CM	12	OMENTUM	PARIETEX COMPOSITE	NO
22	AS	2	34	138	14.9	1.5	62	1.02	140	136	4.1	101	1	0.5	43	41	6.1	3.3	NON REACTIVE	NORMAL	NAD	NAD	1/3/2017	IPOM	GA	2	4 X 4 CM	16	OMENTUM	PARIETEX COMPOSITE	NO
23	GS	2	43	211	14.3	1.3	20	0.8	90	140	3.8	101	0.56	0.28	44	43	6.2	3.8	NON REACTIVE	NORMAL	UMBLICAL HERNIA	NAD	12/9/2017	IPOM	GA	2	2 X 2 CM	4	OMENTUM	PARIETEX COMPOSITE	NO
24	KD	2	63	182	14.6	1.4	102	2.83	198	139	4.1	101	0.8	0.43	18	21	6.1	3.3	NON REACTIVE	NORMAL	UMBLICAL HERNIA	NAD	8/2/2017	IPOM	GA	2	5 X 5 CM	25	SMALL BOWEL , COLON, OMENTUM	PARIETEX COMPOSITE	NO
25	MKJ	2	34	414	10.1	1	20	1	103	130	4	101	0.88	0.47	40	36	6.9	3.9	NON REACTIVE	NORMAL	PARAUMBLICAL HERNIA	NAD	29/4/2017	IPOM	GA	1.3	3 X 3 CM	9	OMENTUM	PARIETEX COMPOSITE	NO

Sr. No.	NAME	GROUP	AGE	DRAINS	INTRAOPERATIVE COMPLICATIONS IF ANY	NEED OF ICU CARE	DURATION OF INDWELLING DRAIN	DURATION OF HOSPITAL STAY	H/S_2 WEEKS	H/S_1 MONTH	H/S_3 MONTHS	SSI_2 WEEKS	SSI_1 MONTH	SSI_3 MONTHS	W/D_2 WEEKS	W/D_1 MONTH	W/D_3 MONTHS	BOWEL_2 WEEKS	BOWEL_1 MONTH	BOWEL_3 MONTHS	RESURGERY_2 WEEKS	RESURGERY_1 MONTH	RESURGERY_3 MONTHS	H/S_2 WEEKS
1	AS	1	38	NO	NO	NO	NO	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2	PG	1	36	NO	NO	NO	NO	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3	BD	1	67	NO	NO	NO	NO	5	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4	MS	1	31	NO	NO	NO	NO	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5	JPS	1	38	NO	NO	NO	NO	5	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6	AS	1	55	NO	NO	NO	NO	6	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
7	MK	1	60	NO	NO	NO	NO	5	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
8	IK	1	41	NO	NO	NO	NO	5	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
9	ZAQ	1	50	NO	NO	NO	NO	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
10	KS	1	37	NO	NO	NO	NO	2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
11	SS	1	68	NO	NO	NO	NO	11	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
12	JS	1	45	NO	NO	NO	NO	14	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
13	JS	1	36	NO	NO	NO	NO	2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14	UR	1	63	NO	NO	NO	NO	7	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15	PK	1	51	NO	NO	NO	NO	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
16	U	1	62	NO	NO	NO	NO	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
17	AC	1	60	NO	NO	NO	NO	6	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
18	B	1	50	NO	NO	NO	NO	6	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19	JD	1	65	NO	NO	NO	NO	8	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
20	GK	1	68	NO	NO	NO	NO	6	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21	PS	1	41	NO	NO	NO	NO	7	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
22	MC	1	35	NO	NO	NO	NO	6	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
23	MS	1	28	NO	NO	NO	NO	5	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
24	NK	1	53	NO	NO	NO	NO	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
25	AJ	1	57	NO	NO	NO	NO	8	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
1	SS	2	77	NO	NO	NO	NO	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2	MS	2	34	NO	NO	NO	NO	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3	AS	2	54	NO	NO	NO	NO	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4	SK	2	40	NO	NO	NO	NO	5	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO
5	SB	2	69	NO	NO	NO	NO	4	YES	YES	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6	PK	2	37	NO	NO	NO	NO	2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
7	GC	2	34	NO	NO	NO	NO	4	NO	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
8	DD	2	31	NO	NO	NO	NO	5	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
9	SCJ	2	40	NO	NO	NO	NO	8	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO
10	NP	2	40	NO	NO	NO	NO	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
11	SS	2	52	NO	NO	NO	NO	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
12	MS	2	58	NO	NO	NO	NO	5	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
13	SD	2	59	NO	NO	NO	NO	5	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14	MK	2	70	NO	NO	NO	NO	5	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15	A	2	62	NO	NO	NO	NO	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
16	BSM	2	53	NO	NO	NO	NO	5	YES	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
17	SS	2	52	NO	NO	NO	NO	6	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
18	PRS	2	73	NO	NO	NO	NO	9	YES	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19	AG	2	52	NO	NO	NO	NO	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
20	IB	2	48	NO	NO	NO	NO	6	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21	RS	2	48	NO	NO	NO	NO	5	YES	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
22	AS	2	34	NO	NO	NO	NO	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
23	GS	2	43	NO	NO	NO	NO	4	YES	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
24	KD	2	63	NO	NO	NO	NO	6	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
25	MKJ	2	34	NO	NO	NO	NO	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Sr. No.	NAME	GROUP	AGE	H/S_1 MONTH	H/S_3 MONTHS	RECURRENCE_2 WEEKS	RECURRENCE_1 MONTH	RECURRENCE_3 MONTHS	CHRONIC_2 WEEKS	CHRONIC_1 MONTH	CHRONIC_3 MONTHS	AIO_2 WEEKS	AIO_1 MONTH	AIO_3 MONTHS	ENT_2 WEEKS	ENT_1 MONTH	ENT_3 MONTHS	OTHERS	TIME TO RETURN TO WORK	DAY OF MOBILIZATION	DURATION OF HOSPITAL STAY IN DAYS	RETURN TO WORK AT POST OPERATIVE DAY	SEVERITY OF PAIN	RECURRENCE	BMI
1	AS	1	38	NO	NO	NO	NO	NO	YES	YES	YES	NO	NO	NO	NO	NO	NO	NAD	11	POST-OP DAY 1	3	11	1	NO	29.8
2	PG	1	36	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	16	POST-OP DAY 1	4	16	1	NO	32.2
3	BD	1	67	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	17	POST-OP DAY 1	5	17	2	NO	31.6
4	MS	1	31	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	12	POST-OP DAY 1	4	12	1	NO	28.8
5	JPS	1	38	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	18	POST-OP DAY 1	5	18	1	NO	29.6
6	AS	1	55	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	18	POST-OP DAY 1	6	18	2	NO	31.7
7	MK	1	60	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	18	POST-OP DAY 1	5	18	1	NO	33.4
8	IK	1	41	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	16	POST-OP DAY 1	5	16	1	NO	30.6
9	ZAQ	1	50	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	10	POST-OP DAY 1	4	10	1	NO	27.9
10	KS	1	37	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	17	POST-OP DAY 1	2	17	2	NO	32.4
11	SS	1	68	NO	NO	NO	NO	NO	YES	YES	YES	NO	NO	NO	NO	NO	NO	NAD	18	POST-OP DAY 1	11	18	4	NO	26.9
12	JS	1	45	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	14	POST-OP DAY 1	5	14	2	NO	31.2
13	JS	1	36	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	13	POST-OP DAY 1	2	13	3	NO	32.6
14	UR	1	63	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	15	POST-OP DAY 1	7	15	3	NO	29.1
15	PK	1	51	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NAD	17	POST-OP DAY 1	3	17	4	NO	28.8
16	U	1	62	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	16	POST-OP DAY 1	3	16	3	NO	30.7
17	AC	1	60	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	16	POST-OP DAY 1	6	16	3	NO	33.2
18	B	1	50	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	17	POST-OP DAY 1	6	17	2	NO	28.8
19	JD	1	65	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	19	POST-OP DAY 1	8	19	5	NO	31.5
20	GK	1	68	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	18	POST-OP DAY 1	6	18	3	NO	30.6
21	PS	1	41	NO	NO	NO	NO	NO	YES	YES	YES	NO	NO	NO	NO	NO	NO	NAD	21	POST-OP DAY 1	7	21	3	NO	29.9
22	MC	1	35	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	20	POST-OP DAY 1	6	20	4	NO	30.6
23	MS	1	28	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	19	POST-OP DAY 1	5	19	2	NO	33.2
24	NK	1	53	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	11	POST-OP DAY 1	4	11	3	NO	28.9
25	AJ	1	57	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	18	POST-OP DAY 1	8	18	3	NO	29.8
1	SS	2	77	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	18	POST-OP DAY 1	4	18	4	NO	31.5
2	MS	2	34	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	19	POST-OP DAY 1	4	19	3	NO	29.5
3	AS	2	54	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	16	POST-OP DAY 1	4	16	3	NO	26.8
4	SK	2	40	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	18	POST-OP DAY 1	5	18	3	NO	27.7
5	SB	2	69	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	17	POST-OP DAY 1	4	17	3	NO	29.8
6	PK	2	37	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	18	POST-OP DAY 1	2	18	2	NO	28.4
7	GC	2	34	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	19	POST-OP DAY 1	4	19	2	NO	31.8
8	DD	2	31	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	15	POST-OP DAY 1	5	15	1	NO	32.5
9	SCJ	2	40	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	NAD	16	POST-OP DAY 1	8	16	2	NO	33.2
10	NP	2	40	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	14	POST-OP DAY 1	4	14	4	NO	32.6
11	SS	2	52	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	20	POST-OP DAY 1	4	20	2	NO	31.7
12	MS	2	58	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	18	POST-OP DAY 1	5	18	1	NO	33.2
13	SD	2	59	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	16	POST-OP DAY 1	5	16	3	NO	32
14	MK	2	70	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	NAD	14	POST-OP DAY 1	5	14	2	NO	30.3
15	A	2	62	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	NAD	22	POST-OP DAY 1	4	22	4	NO	32.6
16	BSM	2	53	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	12	POST-OP DAY 1	5	12	2	NO	30.8
17	SS	2	52	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	13	POST-OP DAY 1	6	13	2	NO	30
18	PRS	2	73	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	23	POST-OP DAY 1	9	23	4	NO	28.8
19	AG	2	52	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	13	POST-OP DAY 1	4	13	2	NO	33.4
20	IB	2	48	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	NAD	25	POST-OP DAY 1	6	25	5	NO	32.7
21	RS	2	48	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	12	POST-OP DAY 1	5	15	1	NO	31
22	AS	2	34	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	15	POST-OP DAY 1	5	15	3	NO	33.9
23	GS	2	43	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	19	POST-OP DAY 1	4	19	3	NO	29.8
24	KD	2	63	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	23	POST-OP DAY 1	6	23	2	NO	27.7
25	MKJ	2	34	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NAD	13	POST-OP DAY 1	3	13	2	NO	32.1

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Date 13.11.18

The Principal,
DMC, Ludhiana.

Subject: **Approval of Plan of Thesis.**

This is to inform you that the Faculty of Medical Sciences in its meeting held on 31.08.2018 has approved the plan of thesis of Ishan Chanana, a student of your college for **MS General Surgery** along with the names of Supervisor/Co-Supervisor as under:-

Topic Plan of Thesis
A prospective study of laparoscopic ventral hernia repair by using ipom-plus technique

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The student may submit the four copies of thesis, to the Controller of Examinations, BFUHS, Faridkot, at least six months before the commencement of theory examination, if he/she is otherwise eligible to take the examination. He /She may be directed to attach a photocopy of this letter with the forwarding letter while submitting thesis in the University along with the letter of approval of University for change of supervisor/Co-Supervisor, change of topic, if any.

SP Singh
Dr. S P Singh MS(Oph)
Controller of Examinations

Note :

1. *If any discrepancy found regarding topic of thesis or Supervisor/Co-Supervisor, inform undersigned within one month after issue of this letter.*
2. *The student may submit the thesis as per the schedule already conveyed i.e for May/June examination 30th Nov of the preceding the year of examination and for Nov/Dec examinations 31st May of the year of examination.*

A PROSPECTIVE STUDY OF LAPAROSCOPIC VENTRAL HERNIA REPAIR BY USING IPOM-PLUS TECHNIQUE

THESIS PROPOSAL

FOR APPROVAL OF SUBJECT OF THESIS TO BE SUBMITTED
IN PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

M.S

in

Surgery

OF THE

BABA FARID UNIVERSITY OF HEALTH SCIENCES
FARIDKOT

JANUARY, 2018

DR. ISHAN CHANANA

DEPARTMENT OF SURGERY
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LUDHIANA

ABSTRACT OF PLAN OF THESIS

Title	A PROSPECTIVE STUDY OF LAPAROSCOPIC VENTRAL HERNIA REPAIR BY USING IPOM-PLUS TECHNIQUE
For the degree of	M.S. in General Surgery
Name of the candidate	Dr. Ishan Chanana
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Institution	Dayanand Medical College & Hospital, Ludhiana
University	Baba Farid University of Health Sciences, Faridkot

Introduction: Hernia is one of the most common surgical problem. Two options are available to repair the hernia: open repair with the closure of the defect with reinforcement with mesh and laparoscopic repair with mesh repair and without closure of the defect. Laparoscopic repair of ventral hernia results in less blood loss ,a shorter hospital stay and less ileus than open repair. To improve the recurrence the hybrid methods combining laparoscopic primary closure and mesh repair were introduced. The laparoscopic augmentation repair or so-called "IPOM Plus" combines closure of the defect with the intraperitoneal onlay mesh placement, as opposed to the classical laparoscopic IPOM, which just patches the defect and overlaps it with intraperitoneal mesh as a bridging repair.

Aim of Study: The aim is to evaluate the safety, efficacy and feasibility of Laparoscopic ventral hernia repair (LVHR) by the method of IPOM - PLUS and its superiority over IPOM with particular reference to complications and recurrence.

Materials & Methods: This prospective study of 1 year for hernia repair by IPOM-Plus will be conducted in General Surgery Deptt of Dayanand Medical College & Hospital, Ludhiana during January 2018 to December 2018 and outcome will be compared with the retrospective data collected for hernia repairs done using IPOM technique during January 2017 to December 2017.

Clinical Significance: The surgical outcomes of IPOM-Plus seems to be favorable as several comparison studies indicated that IPOM-Plus is effective in reducing the recurrence rate or incidence of postoperative complications

Keywords: Ventral hernia · Incisional hernia ·Laparoscopic repair · IPOM-plus · Defect closure. Augmentation technique.

(Signature)	(Signature)	(Signature)	(Signature)	(Signature)
Candidate	Co-supervisor	Co-supervisor	Supervisor	Principal

CERTIFICATE OF FACILITIES AVAILABLE

This is to certify that the facilities for work on the subject of thesis titled **"A PROSPECTIVE STUDY OF LAPAROSCOPIC VENTRAL HERNIA REPAIR BY USING IPOM-PLUS TECHNIQUE"** exist in the Department of Surgery, DMC&H, Ludhiana and will be provided to the candidate. We will see that the data being included in the thesis is genuine and is collected by the candidate herself under our supervision and guidance.

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APPROVAL PROFORMA
BY
RESEARCH & ETHICAL COMMITTEE
DAYANAND MEDICAL COLLEGE & HOSPITAL, LUDHIANA

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Signature of Members of Research Committee with Stamp	**Signature of Members of Ethics Committee with Stamp**
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2. HOD Surgery	2. HOD Pathology
3. HOD Pathology	3. HOD Pharmacology
4. HOD Medicine	4. HOD SPM
5. Dean Academics	5. HOD Medicine
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Approved: (Yes) / No

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BABA FARID UNIVERSITY OF HEALTH SCIENCES, FARIDKOT

PROFORMA FOR REGISTRATION OF SUBJECT FOR DISSERTATION

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4	DATE OF ADMISSION OF COURSE	31.05.2017
5	TITLE OF THE TOPIC	"A PROSPECTIVE STUDY OF LAPAROSCOPIC VENTRAL HERNIA REPAIR BY USING IPOM-PLUS TECHNIQUE "

6. BRIEF RESUME OF THE INTENDED WORK

6.1 NEED FOR THE STUDY

Laparoscopic repair is a safe technique with promising results such as less wound infection and hospital stay; nevertheless follow-up is needed to asses recurrence rate and complications .These are high with open repair though and improving with laparoscopy but still are a concern in the mind of a surgeon.[1]

Ventral hernias are common challenging surgical problems. It is estimated that up to 20 % of abdominal surgeries performed annually in the developed nations complicates to ventral incisional hernias, The results of the ventral hernia repair are imperfect, with high rates of wound complications and hernia recurrence. The early functional advantages for the laparoscopic repair is reflected in an earlier return to normal activities by the patients. Although laparoscopic hernia repair has yielded lower rates of surgical-site infections (SSIs) and hospital stays, rates of wound complications and hernia recurrence have some issues and even the standard techniques are tainted with above said issues.[2]

Laparoscopy is a popular means and the standard of care used for surgeries in today's era and various laparoscopic techniques are routine especially for incisional and ventral hernias. It is now becoming popular in developing countries. However, in the Indian context there are few studies on laparoscopic repair of abdominal wall hernias. This has been evaluated that outcomes of primary fascial closure during laparoscopic ventral hernia repair with mesh that have been reported in the literature. Laparoscopic repair with defect closure along with mesh placement for the management of ventral

hernia was found to be effective in selected cases as evidenced by the low rate of recurrence when compared with conventional laparoscopic repair with mesh placement alone but further studies are warranted to confirm the benefit.[3]

Closing the central defect by reapproximating the fascia may decrease seroma, eventration, and recurrence following laparoscopic ventral hernia. Reducing these complications may lead to improved patient satisfaction and functional status. Primary outcomes evaluated include hernia recurrence, seroma formation, SSI, ME, and TE. Secondary outcomes evaluated include patient satisfaction, chronic pain, and functional status.[4]

Many studies which were previously done have approaches applied under different conditions, such as the techniques used for closure, the size, and site of the hernia and the selection.

With increasing experience, different theories and techniques have been described by different authors to overcome the intraoperative and postoperative problems, The novel technique of closure of defect in laparoscopic hernia repair seems to have the added advantages and as factuated by surgeons that with Adequate dissection of the hernia sac and contents, generous overlap by a well transfixed mesh are integral to good LVHR and seems to have added advantage as well and holds utmost importance.[5]

Although, the surgical outcomes of IPOM-Plus seems to be favorable. The relative merits of the two techniques namely IPOM AND IPOM-PLUS need to be answered properly.

The efficiency of the minimal invasive augmentation technique, over a follow-up period, in the ventral hernias, while adopting the tailoring technique of proper patients' selection and choice of procedure, according to defect size, other characteristics and observations on mesh-related outcomes is yet to properly documented. There is a need to have a properly circumstantiated and factual confirmation of high rate of feasibility and the clinical advantages using the laparoscopic augmentation technique to repair ventral and incisional hernias and it should be objectively scrutinized.

Closing the defect (suturing concept) confers additional benefits to the conventional advantages of LHR, in terms of reducing the overall morbidity, absence of prosthesis migration, and limited adhesion, with a low rate of recurrences and this is very much needed to be substantiated into a prospective study. Also based on previous literature and studies, the current best indications for a successful LVHR procedure should be tailored upon the limitations of the defect's width and proper patient selection and to restore adequately the optimal functionality of the abdominal muscles and provide better outcomes.[6]

However, additional research is needed to further evaluate benefits to the patient in terms of pain and function with cosmesis as well as overall satisfaction. To summarize briefly, the main technical steps for total LVHR that should be properly emphasized, some objective and randomized measurements still needs validation in the future, to better define the indications for IPOM-Plus repair and hence defines the need for the study.

6.2 REVIEW OF LITERATURE

Zeichen et al. performed a retrospective study that compared non closure (n = 93) to closure of the primary fascia (n = 35). The mean follow-up period was 26 months (1–108 months). The study used both percutaneous (n = 18) and intracorporeal (n = 17) closure of the defect. The non closure group had 15.1 % recurrence rate. Two cases of recurrence appeared in the percutaneous closure group. The seroma formation rate was 4.3 % in the non closure group and 11.4 % in the closure group. The study did not report a definition for the outcomes.[1,2]

Banerjee et al. reported a retrospective study that compared nonclosure (n = 126) to closure (n = 67) of the defect. The mean follow-up period was 10.5 months (1–36 months). The follow-up period was the shortest of the three comparative studies. The recurrence rate was 4.8 % in the nonclosure group and 3.0 % in the closure group.[2,3]

Clapp et al. reported a retrospective study that examined the outcomes of defect closure. It was the only study that was risk-adjusted with minimum follow-up criteria. The median follow-up period was 24 months (7–34 months). In the non closure group (n = 36), the recurrence rate was 16.7 %. The closure group (n = 36) experienced no recurrences. Bulging rate was 69.4 % in the non closure group and 8.3 % in the closure group. SSI rate was 13.9 % in the non closure group and 8.3 % in the closure group. Seroma formation rate was 27.8 % in the non closure group and 5.6 % in the closure group. Clapp et al. also reported on patient-centered outcomes. The mean ± SEM patient satisfaction and functional status rates were higher in the closure group than in the non closure group: 8.8 ± 0.4 vs. 7.1 ± 0.5 and 79 ± 2 vs. 71

± 2, respectively. Patient satisfaction was based on a 10-point Likert-type scale, with indicating least satisfied and 10 most satisfied. Functional status was assessed using the Activities Assessment Scale (AAS) The case control groups were well matched. There was no difference in hernia size, hernia type, mesh type, use of permanent sutures, or prior surgical histories between the two study cohorts. The LVHR-TCCD patients developed significantly fewer seromas , less ME , less TE , less clinical eventration and fewer recurrences compared to the sLVHR case–control patients. Patient overall satisfaction, cosmetic satisfaction and AAS functional status scores were superior.[2,4]

Nguyen et al (2014) in Primary Fascial Closure With Laparoscopic Ventral Hernia Repair: Systematic Review concludes that closure with laparoscopic ventral hernia repair appears promising. Indeed, its use may result in lower rates of eventration (bulging), recurrence, and seroma formation. Also, patients appear to be more satisfied with the results and have improved functional status compared to a bridged repair. This particular study has tabulated various studies about various closure techniques and study design and outcomes later described below And in its later discussion it quotes that primary fascial closure during laparoscopic ventral hernia repair with mesh showed promising results. The results of this review have important clinical implications. Fascial closure techniques with subsequent mesh fixation have lower recurrence rates and seroma formation than hernia repairs that bridge the fascial defect. A randomized controlled trial to evaluate the role of closure of the central defect during laparoscopic ventral hernia repair is warranted (n = 20 for eventration or n = 220 for recurrence, a = 0.05, b = 0.20). The

technique that should be examined in the trial should include intracorporeal closure using nonabsorbable suture.[2]

Agarwal et al published that Between April 2004 and June 2006, 29 ventral hernia patients were enrolled without any exclusion. All patients had LVHR performed with this technique. Meanoperative time and hospital stay were 65 min and <1 day, respectively. There were no perioperative complications, conversion, infection, trocar site or recurrent herniation or mortality. The majority of the patients were operated on as day-care surgery. Patients were followed up telephonically for the first 48 h and then by visiting us regularly. There was no postoperative visible bulge. Conclusion Mesh insertion by avoiding 10-mm trocar, double-breasted defect closure, and transfixation using atraumatic needles is a technically easy, safe, and patientfriendly procedure.[5]

CHELALA et al (2015) in Long-term outcomes of 1326 laparoscopic incisional and ventral hernia repair with the routine suturing concept: a single institution experience proves effectively that closing the defect (suturing concept) confers additional benefits to the conventional advantages of LIVHR, in terms of reducing the overall morbidity, absence of prosthesis migration, and limited adhesions, with a low rate of recurrences. The actual purpose of the study was to do retrospective chart analysis reports and assess the long-term (beyond 10 years) safety and efficiency of a laparoscopic incisional and ventral hernia repairs (LIVHR), defending the principle of the suturing defect (augmentation repair concept) prior to laparoscopic reinforcement with a composite mesh (IPOM Plus) was conducted between the years 2000 and 2014.A standardized technique of routine closure of the defect prior to the

intraperitoneal onlay mesh (IPOM) reinforcement was performed in all patients. The standardized technique of "defect closure" by laparoscopy approximating under physiological tension. On the overall early complications of 5.78%, we achieved over time the elimination of the dead space by routine closure of the defect, thus reducing seroma formation with a low risk of infection.[6]

Laparoscopic ventral hernia repair (LVHR) was described on firsts by Leblanc in 1993 for all types of hernia . This surgical technique has improved over the last decade and has proven to be an effective treatment option. With fewer wound complications, faster functional recovery and improved cosmesis has become a solution of choice in the treatment of incisional hernia .However there are still some unresolved issues: a certain number of relapses, problems of fixation of the mesh, the choice of the mesh, and the incidence of seromas. Primary closure of the hernial defect is desirable, although technically complex, as shown by previous experience.[7]

In Trans-fascial closure in laparoscopic ventral hernia repair by Light D et al. One hundred and twelve cases were included. The mean age was 57 years old (range 33–81 years). Fiftynine were females and 53 were males. The median postoperative stay for the non-fascial closure group was 0 days (range 0–12 days). The median post-operative stay for the fascial closure group was 0 days (range 0–12 days). All cases were followed up clinically at 6 weeks. Primary fascial closure during incisional hernia has recently been adopted by a number of centres. A recent systematic review has suggested that there is a reduced formation of seroma and recurrence rate with primary closure.[8]

Palanivelu et al (2006) in Laparoscopic sutured closure with mesh reinforcement of incisional hernias (2006) also concluded that the closure of the defect is ideally preferred by surgeons at any given point of time and is being followed since a decade.[6,7] Laparoscopic repair of ventral hernia is the standard of care in today`s era. With increasing experience, different theories and techniques have been described by different authors to overcome the intraoperative and postoperative problems. D. Sharma et al described a novel technique for closure of defect in laparoscopic hernia repair which has the added advantage . This modification is beneficial in terms of reduction of operating time from that when continuous suturing is performed with the loop suture, preventing mid-suturing give way as all the sutures and knots were primarily separate with less knot pressure, better handling of smaller length sutures and prevention of subcutaneous foreign body sensation. Otherwise it has all the benefits of suturing the defect, such as, absence of postoperative impulse and significant reduction of seroma formation.[9,10]

Gonzales et al did a study and the study included 67 PCD and 67 NPCD. the descriptive statistics for baseline variables and characteristics of the hernia in both techniques, showing similarities between groups presents the descriptive statistics for the outcome variables in both groups. The total surgical time was significantly longer ($t(112.1df) = 2.560$, $P = 0.012$) for PCD compared with NPCD by an average of 19.7 min. The length of follow-up (in months) was significantly longer ($t(132df) = 2.448$, $P = 0.016$) for NPCD compared with PCD by an average of 4.6 months. There were a higher proportion of complications and recurrences in the NPCD (complications: 10.4% vs 3%; recurrences: 7.5% vs 1.5% for NPCD and PCD, respectively). Although these results did

not show a statistically significant difference, a tendency was observed for both variables (χ^2 1df = 2.978, P = 0.084 for complications and χ^2 1df = 2.792 P = 0.095 for recurrences).[11]

Yoshikawa et al (2015) in Incisional ventral hernia is one of the most common surgical complications after laparotomy. Emergency operation for incarceration or strangulation is performed in 3.2% of cases . Two options are available to repair the hernia: direct closure and laparoscopic repair. Suture herniorrhaphy is the simplest of the open repair techniques, but it is associated with a high recurrence rate Mesh repair reduces the recurrence rate significantly compared with suture repair. Laparoscopic repair of incisional ventral hernia results in less blood loss than open repair of large hernias and is associated with a shorter hospital stay. Laparoscopic repair of large incisional ventral hernia is associated with less ileus than open repair Laparoscopic repair of incisional ventral hernia is recommended for defects less than 10 cm in diameter. Even in elderly patient, this procedure is preferentially performed. For obese patients presenting with incisional hernia, the laparoscopic approach is preferred because it reduces the rates of wound infection and complication The infection rate for mesh repair was 0%, compared with 11.5% for suture repair. Laparoscopic repair of incisional ventral hernia is associated with a reduced risk of wound infection . This approach is feasible for defects larger than 15 cm, but it requires more time The size of the incisional hernia predicts the recurrence rate. In a large retrospective study, hernia size was identified as a significant risk factor for recurrence. In particular, recurrence was more likely with defects wider than 10 cm.[12]

Strey et al states that current IPOM techniques do not achieve closure of the midline hernia gap, thereby increasing the risk of persistent mesh bulging with poor abdominal wall function. We propose a novel triple-step hernia repair technique that includes tension-free midline reconstruction. It is achieved through laparoscopic dorsal component separation and laparoscopic suture closure of the midline with a 1.0 polydioxanone suture sling. Combining dorsal abdominal wall component separation, a midline closure with adequate suture strength, and IPOM reinforcement merges the benefits of open and laparoscopic hernia repair. This triple-step technique allows static and functional laparoscopic abdominal wall reconstruction.[13]

Wennergren et al (2015) in Laparoscopic ventral hernia repair with primary fascial closure versus bridged repair: a risk-adjusted comparative study and A multicenter, retrospective database of all ventral hernia repairs performed from 2010–2012 was accessed. Patients who underwent LVHR with mesh were reviewed. Patients who had PFC were compared to bridged repair.[14]

Suwa et al (2015) in Closure versus non-closure of fascial defects in laparoscopic ventral and incisional hernia repairs: a review of the literature actually reviewed the literature on IPOM - Plus, including the details of the surgical procedures and outcomes using the PubMed database for papers published between 1993 and April 2015. It uses a table to define the techniques of IPOM Plus through a tabular form. It describes the surgical techniques and the closure method. The closure methods can generally be classified into extra corporeal or intracorporeal, and by the use of interrupted or running sutures. The reviewed literature described various unique and informative suture techniques. The simplest closure method is the extra

corporeal interrupted suture technique described by Franklin et al. and Liang et al. The unique procedures include "Chelala's reverse U-stitch" , "Agarwal's double-breasted closure", and "Orenstein's shoelacing technique". The "double-breasted closure" is a modification of the renowned Mayo technique described as the "vest-over-pant" technique for umbilical hernia repair. The "shoelacing technique," which consists of "figure-of-eight stitches," is like tying a shoelace to close the hernial orifice.[13] Forty-seven consecutive patients underwent LVHR with defect closure. Average body mass index (BMI) was 32 kg/m2 (range 22-50 kg/m2). Eighteen (38%) patients had an average of 1.5 previous repairs (range 1-3). Mean defect size was 82 cm2 (range 16-300 cm2), requiring a median of 4 (range 2-7) transabdominal stitches for shoelacing. Two patients required endoscopic component separation to facilitate defect closure. Mean mesh size used was 279 cm2 (range 120-600 cm2). Mean operative time was 134 min (range 40-280 min). There were no intraoperative complications. Average length of hospitalization was 2.9 days (range 1-10 days). There were two major postoperative complications [one pulmonary embolism (PE), one stroke]; however, there was no wound-related morbidity or significant seromas. At mean follow-up of 16.2 months, there have been no recurrences. LVHR with defect closure confers a strong advantage in hernia repair, shifting the paradigm towards more physiologic abdominal wall reconstruction. In this series, we found our approach to be safe and comparable to historic controls. While providing reliable hernia repair, the addition of defect closure in our patients essentially eliminated postoperative seroma. We advocate routine use of the shoelace technique during laparoscopic ventral hernia repair.[15,16]

6.3 AIMS AND OBJECTIVES OF THE STUDY

To analyze and compare the complications, immediate as well as long term, and outcomes; in laparoscopic mesh repair of abdominal wall hernias through IPOM-PLUS and IPOM.

7. MATERIALS AND METHODS

Cases will be evaluated prospectively. Cases will be included which involves laparoscopic ventral hernia repair with fascial closure and mesh placement. All cases will be performed with a three-port access from the lateral abdominal wall, using a 12-mm central optical port and two 5-mm instrument ports. Closure will be performed using non-absorbable sutures (1,0 prolene) intracorporeal suturing . The sutures will be passed in barbed / v locking or self locking manner. The sutures will be tied intra-corporeally with reduced pneumoperitoneum bringing pressure upto 8 mmHg to allow an anatomical approximation of the defect. The mesh will be a Composite mesh manufactured for intra-peritoneal placement (Parietex Composite mesh). The mesh size will be selected based on the size of the defect following defect closure which will be calculated by using a sterile ruler and calculating the defect size before the closure of the defect and hence defect + 5 cm will give the mesh size for onlay technique. This step of beforehand calculation favours the fact that if closure of defect; by any chance does not work i.e. opens up; the extra coverage will have enough area to cover the defect. Fixation will be performed using absorbable tacks in a double crown technique. Follow-up will be in the outpatient department post-operatively. Patients will be evaluated for post-operative complications, recurrence and chronic pain (which were defined as ongoing pain during the clinical consultation)

7.1 Source of Data

This prospective study of 1 year for hernia repair by IPOM-Plus will be conducted in General Surgery Deptt of Dayanand Medical College & Hospital, Ludhiana during January 2018 to December 2018 and outcome will be

compared with the data collected for hernia repairs done by using IPOM technique during January 2017 to December 2017.

Inclusion criteria :

- Subjects 18 years of age or older
- All adult patients undergoing laparoscopic mesh repair of Abdominal wall hernia including ventral and incisional hernias, of any etiology.
- Consent to participate in study

Exclusion criteria :.

- ASA class IV or V (severe co-morbid conditions)
- Contra indications for anesthesia and surgery.
- Complicated hernias (obstructive : strangulated)
- Lumbar hernias
- Very large hernia (size > 8 cm)
- Combined abdominoplasty
- Morbid obesity

7.2 METHOD OF COLLECTION OF DATA

- Inclusion and exclusion criteria will be applied to patients presenting to the Dayanand Medical College Hospital, Ludhiana only.
- Patients will be educated about the study and only those patients consenting to participate in the study will be included. Written informed consent will be taken from every participant included in the study.
- Database collection will include documentation of medical history, age, sex, pre hospital interval, vital signs, abdominal signs and drug history.

- Routine investigations done for blunt trauma abdomen such as Haemogram, RFT, Amylase, Lipase, Chest X Ray, Ultrasound abdomen, (CECT Abdomen will be done if needed).
- Regular monitoring of the patients with haemogram, RFT, Amylase, Lipase, Chest X Rays will be done.
- Intra – operative complications like need for open repair or any other complication will be documented.
- Patient will be assesed for Short term complications like SSI, Wound dehiscence, Seroma/ Haematoma, Bowel complications, Need for re-surgery, Duration of hospital stay & Post – operative pain; and Long term complications like Recurrence at 3 months, Seroma/ haematoma, Mesh infection, Chronic pain, Adhesive intestinal obstruction, Enterocutaneous fistulae and Need for re surgery
- Stay of the patient in Ward will be noted in days.
- Follow up after discharge will be done at intervals of 2 weeks, 1 month and 3 months.
- Data collected from the previously done hernia repair by IPOM technique through January 2017 to December 2017.

DURATION OF STUDY

- 1 year
- 1st January 2018 to 31st December 2018

OUTCOME

1. Intra-operative complications
2. Post-operative complications

STATISTICAL ANALYSIS

Data were described in terms of range; mean ±standard deviation (± SD), median, frequencies (number of cases) and relative frequencies (percentages) as appropriate. Comparison of quantitative variables between the study groups was done using Student t-test and Mann Whitney U test for independent samples for parametric and non-parametric data respectively. For comparing categorical data, Chi square ($\chi 2$) test was performed and exact test was used when the expected frequency is less than 5. A probability value (p value) less than 0.05 was considered statistically significant. All statistical calculations were done using SPSS (Statistical Package for the Social Science) SPSS 21 version statistical program for Microsoft Windows.

7.3 DOES THE STUDY REQUIRE ANY INVESTIGATIONS OR INTERVENTIONS TO BE CONDUCTED ON PATIENTS OR OTHER HUMANS OR ANIMALS? IF SO, PLEASE DESCRIBE BRIEFLY.

Yes, patients presenting included in the study will have to undergo haematological, biochemical, radiological investigations as per protocol. For this patients included in the study will be informed regarding their inclusion and written informed consent will be taken for all the patients included in the study. These are however, essential for the patient management and are a part of the routine protocol for the management for hernia.

7.4 HAS ETHICAL CLEARANCE BEEN OBTAINED FROM YOUR INSTITUTION IN CASE OF 7.3?

Attached alongwith

LIST OF REFERENCES

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PROFORMA

Sr. No. ___

NAME AGE/SEX

MRD NO ADDRESS

OCCUPATION MOBILE

DATE OF ADMISSION

DATE OF SURGERY

DATE OF DISCHARGE

CHIEF COMPLAINTS

HISTORY OF PRESENTING ILLNESS

PAST HISTORY

MALIGNANCY:

CHRONIC STEROID USE:

DIABETES:

COPD:

CARDIOVASCULAR:

OTHERS:

Signature of Candidate **Signature of supervisor**

PERSONAL HISTORY

SMOKING:

ALCOHOL ABUSE:

NICOTINE/OPOID ABUSE:

GENERAL EXAMINATION

VITALS (ON ADMISSION)

HR	BP	RR	TEMP
Built	Nutrition		
GCS	Pallor	Edema	Icterus
Cyanosis	Lymphadenopathy		
Clubbing JVP			

SYSTEMIC EXAMINATION

ABDOMEN

INSPECTION

PALPATION

PERCUSSION

AUSCULTATION

Signature of Candidate **Signature of supervisor**

RESPIRATORY

CVS

CNS

CLINICAL DIAGNOSIS:

INVESTIGATIONS

Date					
HEMOGLOBIN					
TLC					
DLC					
PLATELETS					
PTI/INR					
B.UREA					
S.CREATININE					
B.SUGAR					
Na/K/CL					
T.BILIRUBIN					
D.BILIRUBIN					
SGOT					
SGPT					
T.PROTEINS					
ALBUMIN					

Signature of Candidate **Signature of supervisor**

VIRAL MARKERS:
HbsAg/ ANTI-HCV/ ANTI-HIV:

CHEST X RAY

USG ABDOMEN

OTHERS

OPERATIVE DETAILS:

DATE OF SURGERY:

NAME OF PROCEDURE:

TYPE OF ANAESTHESIA GIVEN:

DURATION OF SURGERY:

INTRAOPERATIVE FINDINGS:

DEFECT SIZE:

CONTENTS:

MESH REPAIR:

NEED FOR OPEN REPAIR:

DRAINS:

INTRAOPERATIVE COMPLICATIONS IF ANY:

Signature of Candidate **Signature of supervisor**

POST-OPERATIVE DETAILS:

NEED OF ICU CARE:

DURATION OF DRAIN INDWELLING:

DURATION OF HOSPITAL STAY:

POST-OPERATIVE COMPLICATIONS:

DURATION	2 WEEKS	1 MONTH 3 MONTHS
HEMATOMA/ SEROMA FORMATION:		
SSI:		
WOUND DEHISCENCE:		
BOWEL COMPLICATIONS:		
NEED FOR RE SUREGERY:		
MESH INFECTION:		
RECURRENCE:		
CHRONIC PAIN:		
ADHESIVE INTESTINAL OBSTRUCTION:		
ENTEROCUTANEOUS FISTULAE:		

OTHERS:

TIME TO RETURN TO WORK:

Signature of Candidate **Signature of supervisor**

OUTCOME:

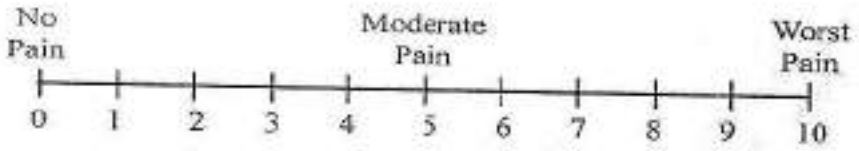
DAY OF MOBILIZATION:

DURATION OF HOSPITAL STAY IN DAYS:

RETURN TO WORK AT POST OPERATIVE DAY:

SEVERITY OF PAIN:

VAS SCALE



RECURRENCE (YES/NO)

Signature of Candidate **Signature of supervisor**

INFORMED PATIENT CONSENT

Date: _____

I.....D/o, W/o, S/o.....

.....am willing to participate in the study **"A PROSPECTIVE STUDY OF LAPAROSCOPIC VENTRAL HERNIA REPAIR BY USING IPOM-PLUS TECHNIQUE"** The procedure with its complications has been explained to me in local vernacular language. I have fully understood that no special tests and extra expenditure in any form, merely for the purpose of thesis is being carried out. I am free to opt out the study any time without assigning any reason.

.....
Signature of the Witness

Name:

.....
Signature of the patient

Signature of Candidate

Signature of Supervisor

मरीज अनुमति फार्म

तिथि _____

मैं _____ पत्नी/पुत्र/पुत्री _____

निवासी _____

इस शोधकार्य "A PROSPECTIVE STUDY OF LAPAROSCOPIC VENTRAL HERNIA REPAIR BY USING IPOM-PLUS TECHNIQUE" में भाग लेने के लिए सहमत हूँ। मैं इस शोधकार्य में भाग लेने के लिए अपनी स्वेच्छा से तैयार हूँ। मैं पुष्टि करता/करती हूँ की यह स्वीकृति देने के लिए मुझे कोई आर्थिक प्रलोभन नहीं दिया गया और न ही दबाव डाला गया है। मुझे इस शोधकार्य का उद्देश्य स्पष्ट कर दिया गया है और मुझे यह विश्वास है की यह विज्ञान और मानवता के लाभ के लिए है। मुझे इस शोधकार्य में होने वाले जोखिम के बारे में समझा दिया गया है और मेरी समझ में यह जोखिम बहुत मामुली है।

मैं इस शोधकार्य में भाग लेने के सम्बन्ध में किसी भी समय अपनी अस्वीकृति व्यक्त कर सकता/सकती हूँ और मेरे अस्वीकृति व्यक्त करने का मेरे इलाज पर कोई प्रभाव नहीं पड़ेगा।

_____

गवाह के हस्ताक्षर

नाम:

_____

रोगी के हस्ताक्षर/अंगूठे का निशान

नाम:

_____

अन्वेषक के हस्ताक्षर

_____

विद्यार्थी के हस्ताक्षर

ਮਰੀਜ਼ ਰਜ਼ਾਮੰਦੀ ਫਾਰਮ

ਮਿਤੀ_____

ਮੈ_____ਪਤਨੀ/ਪੁੱਤਰ/ਪੁੱਤਰੀ_____

ਵਾਸੀ _____

"A PROSPECTIVE STUDY OF LAPAROSCOPIC VENTRAL HERNIA REPAIR BY USING IPOM-PLUS TECHNIQUE" ਤੇ ਚਲ ਰਹੀ ਖੋਜ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਰਜ਼ਾਮੰਦ ਹਾਂ। ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਮੈ ਆਪਣੀ ਮਰਜ਼ੀ ਨਾਲ ਭਿਅਰਚ ਹਾਂ। ਮੈ ਇਹ ਦਸਣਾ ਚਾਹੁੰਦਾ ਹਾਂ/ ਚਾਹੁੰਦੀ ਹਾਂ ਕੇ ਇਹ ਰਜ਼ਾਮੰਦੀ ਦੇਣ ਵਾਸਤੇ ਮੈਨੂ ਕਿਸੇ ਵੀ ਤਰਾਂ ਦਾ ਲੋਭ-ਲਾਲਚ ਨਹੀ ਦਿੱਤਾ ਗਿਆ ਅਤੇ ਨਾ ਹੀ ਕੋਈ ਦਬਾ ਪਾਇਆ ਗਿਆ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਦਾ ਮਨੋਰਥ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਤਰੋਸਾ ਦਵਾਇਆ ਗਿਆ ਹੈ ਕੇ ਇਹ ਖੋਜ ਵਿਗਿਆਨ ਅਤੇ ਮਾਨਵਤਾ ਦੀ ਭਲਾਈ ਲਈ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਵਿਚ ਹੋਣ ਵਾਲੇ ਖਤਰੇ ਬਾਰੇ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਯਕੀਨ ਹੈ ਕੇ ਇਹ ਖਤਰਾ ਬਹੁਤ ਮਾਮੂਲੀ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਦਾ ਢੰਗ – ਤਰੀਕਾ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ।

ਮੈ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਬਾਰੇ ਆਪਣੀ ਰਜ਼ਾਮੰਦੀ ਕਿਸੇ ਵੀ ਸਮੇ ਵਾਪਸ ਲੈ ਸਕਦਾ ਹਾਂ/ ਸਕਦੀ ਹਾਂ ਅਤੇ ਮੇਰੀ ਰਜ਼ਾਮੰਦੀ ਵਾਪਸ ਲੈਣ ਦਾ ਮੇਰੇ ਇਲਾਜ ਤੇ ਕੋਈ ਅਸਰ ਨਹੀ ਹੋਵੇਗਾ।

_____
ਗਵਾਹ ਦੇ ਹਸਤਾਖਰ

ਮਿਤੀ_____

ਪਤਾ _____

_____
ਮਰੀਜ਼ ਦੇ ਹਸਤਾਖਰ

ਮਿਤੀ_____

ਪਤਾ _____

_____
ਨਿਰੀਖਕ ਦੇ ਹਸਤਾਖਰ

_____
ਸਿਖਿਆਰਥੀ ਦੇ ਹਸਤਾਖਰ